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AUTOMOTIVE INDUSTRIES
VOLUME 54 *Philadelphia, Thursday, April 15, 1926* NUMBER 15

Time-Payment Plans Widening Market *for* American Cars Abroad

Establishment of facilities for extension of credit to foreign dealers and consumers will open up vast new sales prospects for U. S. manufacturers

By John C. Gourlie

IF American exports of cars and trucks show the gain this year that is confidently predicted for them—and there is every indication that they will—it is quite probable that a part of the improvement may be attributed to better and more extended financing facilities.

Automobile manufacturers, in cooperation with finance companies, are engaged in what is perhaps a unique penetration of foreign markets, employing one of the most powerful sales weapons ever devised—partial payments for dealers and consumers. Although the plan as applied to exports is not, accurately speaking, new, its development still lies largely in the future, and foreign sales today stand almost in the same position as domestic sales before instalment selling became general. The possibilities inherent in the plan are so great that they can hardly be grasped.

ESTIMATES of the extent to which cars are sold on time payments in foreign countries are largely guess-work, but it is believed that the proportion is less than 50 per cent. Doubtless it would be much higher if lower finance rates and adequate credit facilities were established.

By bringing down rates and extending the advantages of American retail plans to prospective purchasers everywhere, the American automotive industry is destined to expand its market on a scale otherwise impossible.

A survey of the situation today brings out the following pertinent facts:

1. Financing of dealers has been carried much further than financing of consumers.
2. Rapid expansion of credit facilities is going on or is in contemplation.
3. Companies which have had the aid of foreign time plans show gains in exports much greater than the average for the industry as a whole.
4. The difficulties of financing retail sales abroad, though serious, are being satisfactorily solved.

So far, American financing facilities have been enjoyed mainly by the companies served by the General Motors Acceptance Corp., and the Industrial Acceptance Corp., but plans now in course of completion, which may be announced before this article reaches its readers, insure similar facilities for most of the other large producers. Assuming that these new plans are carried out quickly, the 1926 total of exports should give concrete evidence of the stimulation of financing.

Although the G. M. A. C. has been engaged in financing foreign General Motors dealers for several years, it was only last year that any comprehensive program of retail financing was attempted. The reason for this delay has been the greater complexity of retail operations abroad. It was possible to finance dealers from the home office in this country, but to handle the consumer end it was necessary to establish foreign branches or agencies to supervise the details of collections, terms, and so forth.

This corporation, however, now has branches, or operates as a division of foreign resident subsidiaries of General Motors Corp., in the following cities: Copenhagen, Hamburg, Antwerp, London, Madrid, Sao Paulo and Buenos Aires. Before the end of the year other branches will be established in South Africa, Australia and New Zealand, thus covering virtually all the important export markets.

Overseas sales of General Motors cars and trucks totaled 100,894 units in 1925, against 45,000 in 1923, a gain of slightly over 120 per cent during a period when foreign financing was mainly restricted to wholesale business. Total exports of cars and trucks from the United States

and Canada gained only 69 per cent in the two-year period. The Studebaker Corp., for which the Industrial Acceptance Corp. began to operate in overseas markets last year, gained 64 per cent in exports as against 1924, while the industry as a whole was bettering its position by 47.7 per cent.

The value of export financing has become obvious to all who have given any attention to the matter. But there are a number of good reasons why development along these lines has up to now been slow. They are:

1. The fact that there are few foreign finance companies, operating with foreign capital.
2. Where such foreign companies, exist, their rates are so high as to add enormously to the cost of the car.
3. Uncertainty with regard to exchange rates and other conditions affecting business and finance have made American companies wary of entering the market.
4. Laws affecting time sales vary widely in foreign countries, requiring a large number of different plans to cover the field adequately.

Exports Looming Larger

These adverse factors continued to operate against the extension of credit facilities in the export markets so long as the energies and capital of the leading American car and truck producers were occupied by the rapidly expanding domestic market. But now that annual increases in sales are largely in the foreign field, the need for greater attention to exports has become patent, and where the need and the desire existed, the facilities were sure to be offered.

It is, indeed, a most surprising thing that American motor vehicle exports have attained their present volume when the onerous burdens placed on foreign dealers by the lack of adequate credit facilities are considered. In most cases, the foreign dealer has had to use his own capital to finance shipments of cars, and where he has sold cars on time, it has also been with his own capital. The resources required for these operations have been many times the funds needed by an American dealer with the same annual turnover of cars.

At the same time, the foreign dealer in American cars has had to compete with dealers handling foreign cars and placed in a more advantageous position by their nearness to the factories. Most of the foreign factories have been extending credit to their dealers, allowing them often 60 to 90 days to pay and making no extra charge for the service or in some cases have actually consigned stocks to dealers. The dealer thus is enabled to operate with a smaller capital and conserve his resources for the extension of retail credit.

Of course in most markets the American car has had a price advantage. Not only are foreign costs of production much higher, but the price to the dealer naturally is enhanced by the costs of extending credit to him. Inasmuch as to compete with the foreign producers on the same basis would require higher prices for American cars and a large amount of additional capital for the producers, the American companies have adopted the wiser course of keeping down prices and enabling the dealer, through finance companies, to obtain the necessary credit at a moderate charge.

A Competitive Advantage

In the long run these methods should give American cars an enormous competitive advantage. Not only will they sell at lower prices, quality considered, but through retail financing they will be able to offer instalment rates far more attractive to the purchaser than those any foreign dealer can quote. And adequate financing of dealers should mean great gains in foreign representation.

The basis of foreign financing is, after all, the same as domestic financing. It depends, in the final analysis, on the character of the risk, and it is possible to gage the credit standing of a foreign dealer or consumer, when the methods are learned, about as closely as in the case of a domestic dealer or consumer.

As a matter of fact, credit is so much on a personal basis in so many foreign countries that the standing of any individual or company is very widely and accurately known. Laws and courts frequently protect the seller less adequately than they do here, so it is all the more necessary for the individual to maintain his repute in order to do business in his community.

In view of the legal situation, it is doubtful whether there will ever be any large volume of no-recourse business done in foreign countries. In certain of the Latin countries, in South America and Europe, the seller on time is not permitted to repossess the car in case of default; he merely is a general creditor. Hence dealer-indorsement is overwhelmingly desirable, and in the case of wholesale financing the indorsement of the dealer's bank may be required.

It is this necessity of fitting plans and methods to local conditions that has been one of the reasons why wholesale financing has been given precedence over retail. It is possible to extend credit to dealers from the home offices of financing companies here on much the same basis the world over, but retail plans involve the setting up of agencies or branches to meet local requirements.

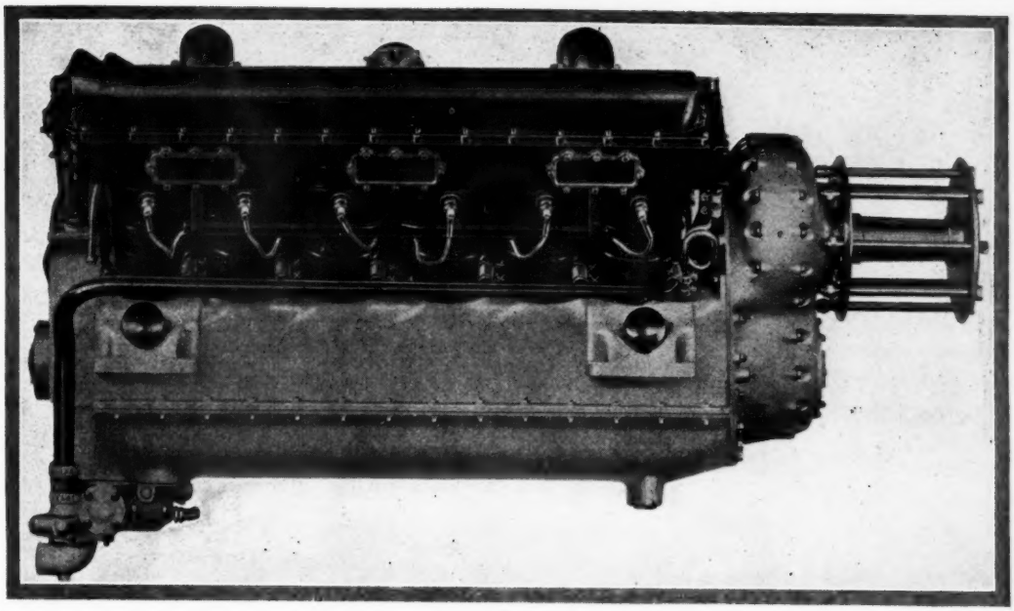
Trouble is Justified

It seems plain, however, that the end in view justifies the trouble and expense of establishing retail facilities. There is a good profit in the business, too, because it is possible to charge much higher rates and still keep under foreign competition. Due to shortages of capital in some countries and faulty banking systems in others, rates of interest are virtually everywhere higher than in the United States. A dealer in Mexico, for instance, may have to pay his bank as much as 2 per cent a month, or even higher, for loans on a consignment of cars. Where foreign finance companies do exist, and operate on foreign capital, they naturally charge even higher rates than the banks.

These, then, are the reasons why it is desirable to have American capital rather than foreign handle time sales abroad.

Competition exists, however, not only in rates but in terms. Some of the European cars, due to the high profits per unit to manufacturer and dealer, are sold on terms that make the worst excesses of American time-selling seem conservative. Instances of 10 per cent down and two years to pay have been given and the cars mentioned are among the best-known foreign makes. But this would appear to cail for education of the consumer. He must be made to see, as is being pointed out to him here, that easy terms mean high costs, and that he must consider his costs as well as the amount and number of down payments and instalments.

Estimates of the extent to which cars are sold on time in foreign countries are of course largely guesswork, but it is belived that the proportion is less than 50 per cent. Doubtless it would be much higher were rates lower and did the facilities exist. By bringing down rates and extending the advantages of American retail plans to prospective purchasers everywhere, the automotive industry is destined to expand its market on a scale otherwise impossible.



THIS photograph shows a side view of the Model 1-A—2500 geared Packard airplane engine of 600 hp. Aside from the fact that in the direct drive engines the gearbox is missing and the propeller hub is mounted on an extension of the crankshaft, the other four models referred to in the following article are of very much the same appearance

Low Weight and Compactness Feature Packard Aero Engines

New 600 hp. model 150 lb. lighter than war-time Liberty and delivers 200 hp. more. The 800 hp. type is built along same lines. Building 10 a month to fill Government order for 250.

By Leslie S. Gillette

As a result of being awarded Government contracts to the amount of $3,737,000, including the largest single contract for aviation material authorized since the war, the Packard Motor Car Co. has considerably increased production on its five types of airplane engine. Ten complete engines are now being produced per month and the contracts will be completed in about 15 months.

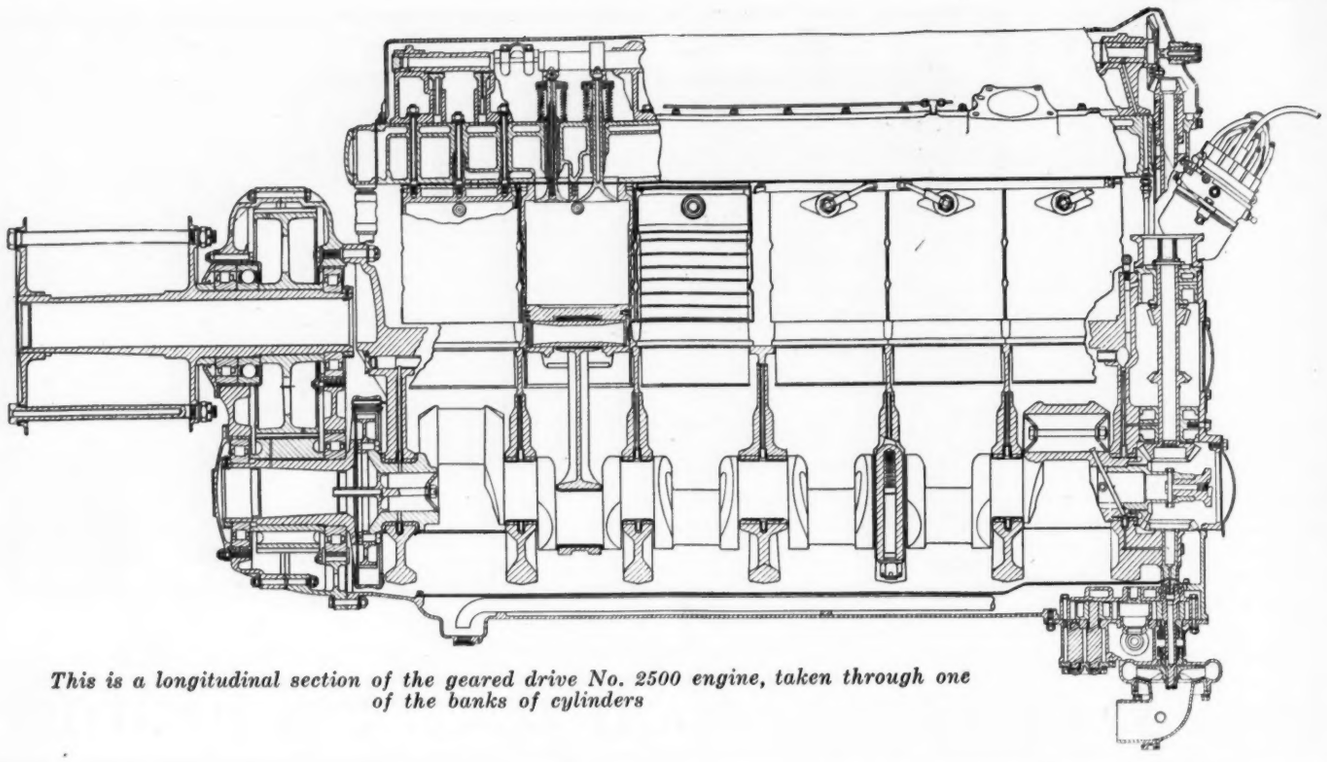
All five of the Packard types are of the same fundamental design, being twelve-cylinder, V-type, water-cooled engines. The series was developed from three 450 hp. powerplants originally built for the Government in 1922, and the present 600 hp. is said to have the lowest specific weight of any engine that ever passed the Government 50-hour test.

Since the order for the 450 hp. engines was placed, there has been relatively little change in design, although each year has witnessed a reduction in the weight-power ratio and an increase in durability. During the past three years there has been the closest cooperation between the factory and the Government engineers, with the result that many modifications designed to secure higher power output were recommended by the Navy and Army engineers and later adopted by the factory.

The five types of engine may be divided into two distinct classes, the No. 1500 or 600 hp. series, and the No. 2500 or 800 hp. series. The smaller model is sponsored by the Navy and the 800 hp. engine by the Army. Both are built in two forms, for direct drive and for geared drive, the smaller engine being also adaptable for operation in the inverted position. The general design of all five engines is the same except as regards dimensions, and in the case of the inverted engine, a few minor changes made necessary by this arrangement.

The contract calls for 175 engines of the 2500 series and 75 of the 1500 series and also covers spare parts, tools and reconditioning. A large portion of the No. 2500 engines are to be fitted into heavy-duty flying boats and daylight bombers, while most of the smaller engines will be fitted to the scouting planes attached to the two latest aircraft carriers, the Saratoga and Lexington. Ten of the inverted engines will be used in Loening amphibians.

As compared with the war-time Liberty engine, the Packard No. 1500 weighs 150 lb. less and delivers 200 hp. more. The outstanding feature of the engines, apart from the low power weight ratio, is the compact design, which is clearly brought out by the superimposed views shown in Fig. 1. Reductions in the overall length of the engine was the result of extensive research in connection with bearings, which showed that with proper lubrication the length could be cut in half. This made it possible to place the cylinders closer together. The unusual cylinder design and the comparatively short stroke cut down the overall height, thus reducing the



This is a longitudinal section of the geared drive No. 2500 engine, taken through one of the banks of cylinders

Principal Characteristics of Packard Engines

Model	Bore and Stroke	Rating	Weight	Comp. Ratio	B. M. E. P.	Cyl. Angle
1500-Direct	5⅜ by 5½	600 hp.-2500	730 lb.	5.5	136	60 deg.
1500-Geared	5⅜ by 5½	600 hp.-2500	850 lb.	5.5	136	60 deg.
1500-Inverted	5⅜ by 5½	600 hp.-2500	750 lb.	5.5	136	60 deg.
2500-Direct	6⅜ by 6½	800 hp.-2000	1146 lb.	5.7	138	60 deg.
2500-Geared	6⅜ by 6½	800 hp.-2000	1300 lb.	5.7	138	60 deg.

head resistance of the engine and giving the plane manufacturer greater freedom in his design.

With the No. 1500 engines, speeds up to 2600 r.p.m. have been made possible by strengthening the crankcase, and by taking the reaction to the explosion on steel bolts instead of on the aluminum case. It was the desire of the Navy Department that the No. 1500 engine be developed to give 600 hp. at 2500 r.p.m., so that when operating under normal conditions and giving approximately 500 hp. at 2000 r.p.m. the stresses would be well inside the safe limit, thus insuring a longer life.

The No. 1500 develops a maximum of 615 hp. at 2600 r.p.m., the No. 2500, 835 hp. at 2100 r.p.m.

A detailed description of the engines should logically commence with the cylinder, the design of which contributes materially to the compactness of the engine as

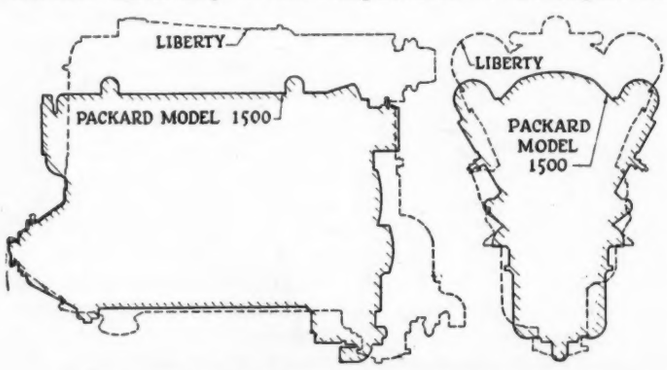


Fig. 1. Packard No. 1500 and Liberty engine superposed. The former weighs 150 lb. less and develops 200 hp. more

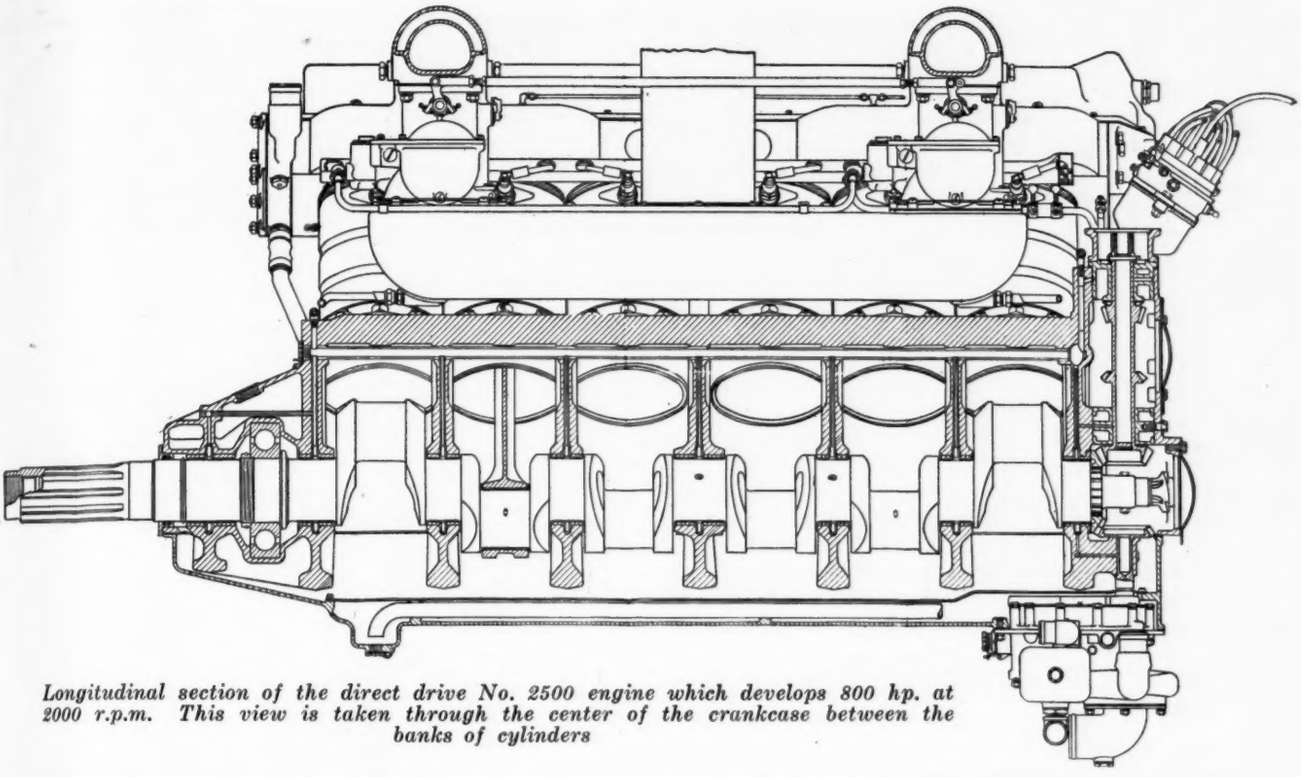
a whole. The six individual steel cylinders are tied together by an aluminum casting bolted to their upper ends. This casting also serves to distribute the mixture to the cylinders, to lead away the exhaust, to act as a water header, and to support the camshaft bearing pedestals and valve stem guides. The cylinders are made up by welding a drawn steel sleeve to a forged combustion chamber that is machined all over and closed by a steel head plate. The sheet metal water jacket is welded in place and extends nearly to the hold-down flange. (Fig. 2).

Four valves, two inlet and two exhaust, are provided per cylinder. The head plate is bored so as to be a press fit over the valve ports, and by setting on shoulders allows ¼ in. space over the combustion chamber. Water enters the jacket of each cylinder from a manifold through a short inlet pipe welded to the jacket near its bottom. From the cylinder jackets the water passes through a series of drill holes in the top plate arranged radially round the exhaust ports. A single copper-asbestos gasket between the cylinders and the aluminum valve housing serves as a water seal and to prevent leaks between the inlet and exhaust passages.

Valve Housings Interchangeable

Five studs screwed into bosses on each cylinder head secure the valve housing. The latter is machined all over and can be used interchangeably on left and right hand banks. As will be seen from Fig. 3, mixture is delivered to three cylinders from a single manifold connection. Two adjacent cylinders have their exhaust ports siamesed, hence there are three exhaust ports on each cylinder bank. The water circulating through the housing leaves it through a single outlet at the front. The unusual layout of the intake and exhaust allows large and free passages and simplifies the casting operation.

A single camshaft provided with 12 integral cams is suported in seven cast duralumin bearings which are formed in pedestals that are bolted to the top of both valve housings. Each cam operates a pair of valves through the medium of a cam follower. The



Longitudinal section of the direct drive No. 2500 engine which develops 800 hp. at 2000 r.p.m. This view is taken through the center of the crankcase between the banks of cylinders

latter works in a guide formed in the camshaft bearing pedestal and is prevented from turning by a flat milled surface on the side of the camshaft bearing. The followers are positively lubricated from the camshaft bearing by ducts leading from the bearing proper through the pedestal to the follower guide. This is a feature of the engine, as it furnishes a ready means for the oil cooling of the exhaust valves. Fig. 4 shows the arrangement.

Circulation of the oil through the exhaust valves is as follows: Oil is supplied under pressure to the hollow camshaft through a metering groove in the rear bearing. In the camshaft journal next to each exhaust cam a hole is drilled opposite to the nose of the corresponding cam. This hole in the journal registers with a vertical passage in the camshaft bearing pedestal when the cam is at its highest point and the exhaust valve consequently closed. Oil flows through this passage to the bottom of the cam follower guide and fills up the space left when the cylindrical shank of the follower is at the top of its stroke. As the camshaft revolves the oil passage is closed and the cam depresses the follower, thereby forcing the oil up through the hollow center of the follower shank and into a hole drilled through the follower lengthwise. The follower is clamped to the stems of the two valves, and the hole through it communicates with the holes in the valve stems.

A small screw-in plug in the valve head closes the drilled out valve stem. To this plug is welded a small steel tube which is centered in a counterbore at the upper end of the valve stem. Oil enters the tube and is forced out at the bottom through horizontal holes, thus cooling the head of the valve. Thence, the oil passes between the tube and the wall of the valve stem, and is discharged into the valve housing cover through horizontal holes in the wall of the stem just below the counterbore. By this arrangement a fixed quantity of oil is pumped through each exhaust valve every time it opens, and positive cooling is assured.

Another departure from conventional construction is found in the valve spring arrangement. A series of piano wire coiled springs are arranged around the valve stem guide in a circle. Each spring is located over a tubular guide welded to a fixed lower washer, and at the upper end the springs are surrounded by a cap-shaped spring washer (see Fig. 5). On the No. 1500 engines there are seven springs per valve; on the No. 2500 engines, ten. This design has been used on Packard

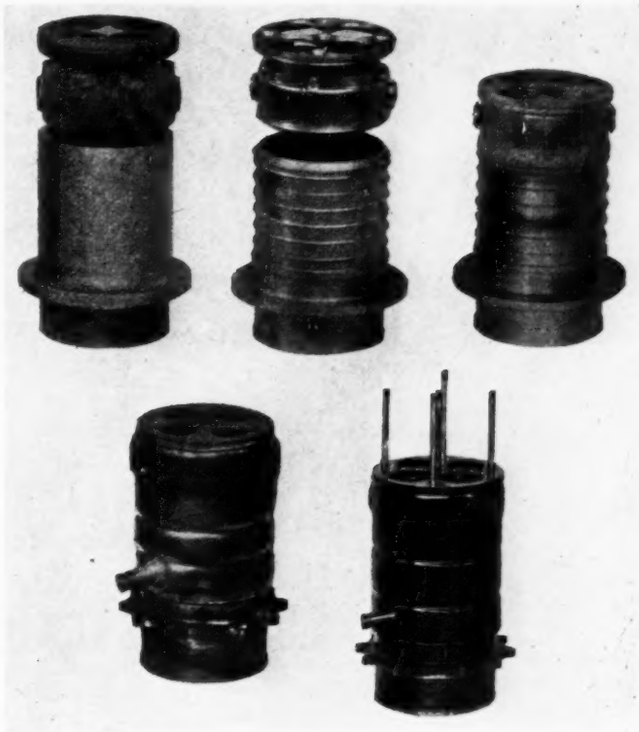


Fig. 2. Steps in the construction of the cylinders. The headplate is welded to the combustion chamber, which latter is welded to the barrel, and finally a sheet metal water jacket is welded on

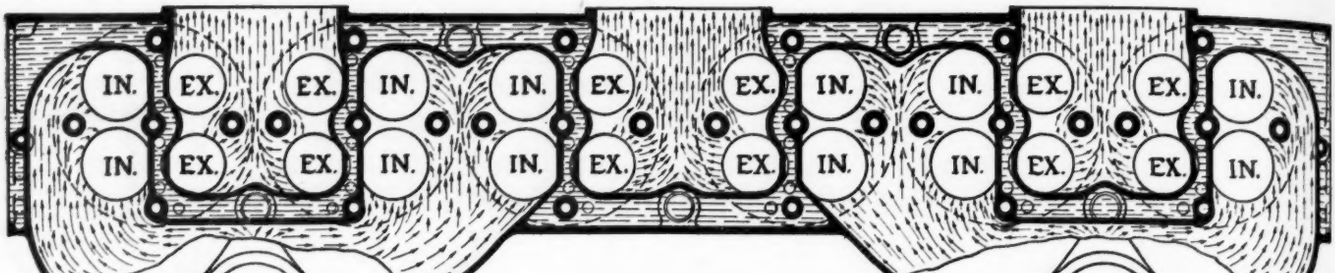
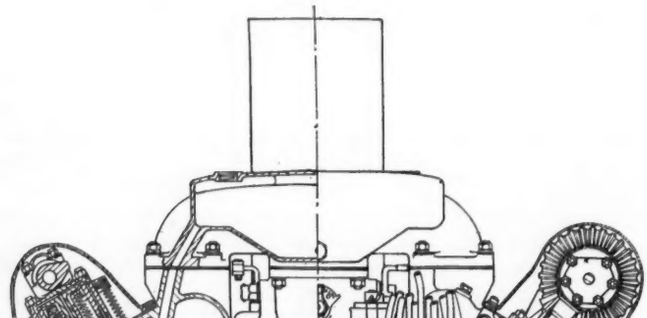


Fig. 3. Cross section through valve housing which is machined on all sides

marine engines for several years, and, contrary to the general impression, their prime function is not to provide a higher factor safety, but to lessen the "dancing" action resulting with the more conventional type of springs.

Unusually high crankshaft speeds have been made possible by a new method of supporting the bearings and an improved crankcase construction. The seven main bearings are carried in the heavily reinforced transverse webs in the upper half of the case, the bearing caps being duralumin forgings, except in the case of the front and rear bearings, which are cast. Babbitted, steel-backed main bearings are employed, which are doweled to both the bearing caps and the upper half of the crankcase. Oil is delivered to the bearings through a horizontal manifold in the upper half of the case and is distributed to each bearing through



Transverse section of the No. 2500 engine. The left side shows the section through right cylinder looking toward rear, while other side shows rear of engine looking forward

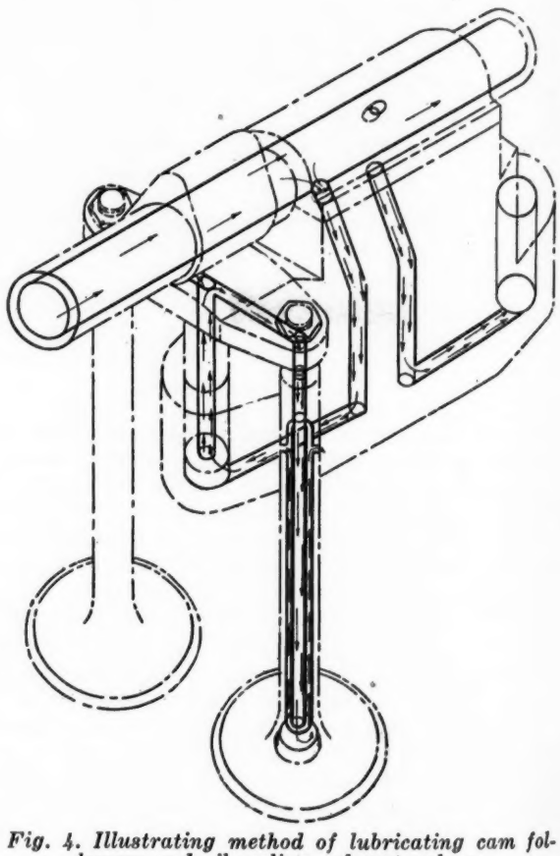


Fig. 4. Illustrating method of lubricating cam followers and oil-cooling exhaust valves

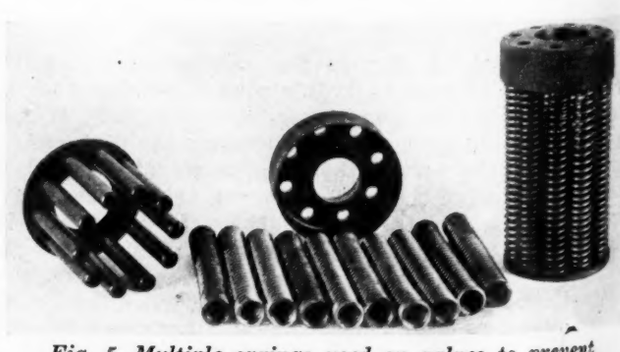


Fig. 5. Multiple springs used on valves to prevent "dancing" at high speeds

vertical tubes pressed into the cross walls of the crankcase. All loads on the bearing caps are taken up on long steel bolts anchored at the cylinder hold-down flanges and extending through the crankcase cross walls. This arrangement supersedes the previous one by which the bearing caps were secured to the crankcase by short studs. The joint surfaces between the bearing cap and the upper half of the case form an included angle of 120 deg. This type of construction, which is illustrated in Fig. 6, makes for considerably greater rigidity.

On the No. 1500 engine the finished surface of the crankcase is brought down 2½ in. below the crankshaft axis, and on the No. 2500, 2¾ in. This insures a more rigid crankcase structure; allows for "ways" into which the main bearings are fitted, and also makes the lower

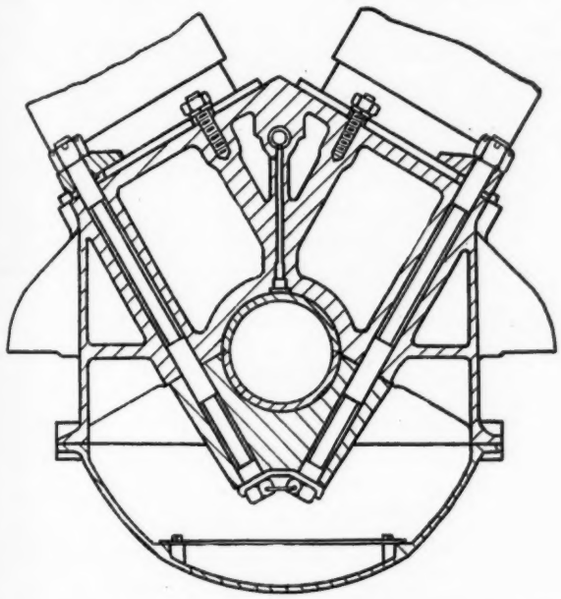


Fig. 6. New method of securing bearing caps by means of "through" bolts

half of the case more accessible. In the aluminum oil pan is mounted the combined water and oil pump unit. A scavenging oil line leading from the pump serves to keep the oil pan clear when the plane is on a glide. It is not necessary to disturb the engine bearings to remove the oil pan.

Customary aircraft engine practice is followed in the design of the crankshafts. They are made of one-piece drop forgings machined all over and accurately balanced. The main journals are of 3 in. and 3½ in., and the crankpins of 2½ in. and 3¼ in. diameter, on the 1500 and 2500 series respectively. Crankpins and journals are drilled out to unusually large diameters, and the crankpin openings are closed by conical steel washers secured by a bolt. Oil is delivered to the reservoirs thus formed by a steel tube pressed into the crankshaft at an angle and lining up with the main bearing metering grooves at one end and the crankpin bore at the other. The metering grooves are located entirely in the upper half of the main bearing and extend 20 deg. around the circumference in the No. 1500 and 30 deg. in the No. 2500 engines.

Since a recent change in design, both engines employ the articulated type of connecting rods. This form of construction offers a more rigid backing for the bearings, which are now of babbitt applied directly to the rods. The link rod is attached to the master rod by a hollow link pin, with a phosphor bronze bushing in the link rod. The pin being held in the master rod by a tapered draw bolt passing through a boss on the master rod. These rods are "I" section steel forgings machined all over. The piston pins are of approximately the same diameter as the link pins, and are of the full floating type bearing on phosphor bronze bushings in the rods and directly on the bosses of the piston. Endwise movement is prevented by snap rings in the bosses.

Slipper type pistons, of aluminum cast in permanent moulds, are employed. They are unusually short, consequently very light. In the smaller engine the pistons are 3 11/32 in. long and weigh 2.94 lb. bare, while in the larger they are 3 15/16 in. long and weigh 4.47 lb. bare. Three ⅛ in. rings are used above the piston pin, and oil drain holes are provided below the lowest ring groove.

All accessories and the timing gear drives are grouped at the rear of the engine, a bevel gear pinion being mounted on an extension of the crankshaft. Considerable ingenuity has been exercised in laying out the drives, and the cam shaft center drive shaft now can be removed without dismantling the engine, while each of the other units can be detached without disturbing the adjacent drives. In arranging the accessories, two major objects were aimed at, namely, to provide maximum accessibility for field service work and to save weight. Gearing and shafts are formed integral wherever pos-

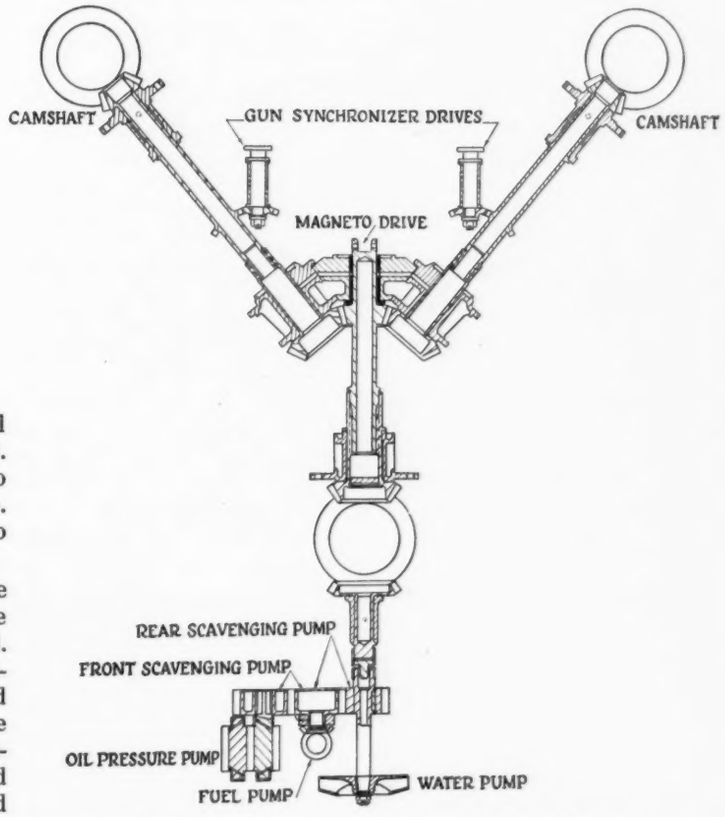


Fig. 7. General arrangement of camshaft and accessories drives at rear of engine

sible, and by the use of pressure-lubricated, chilled aluminum plain bearings, the greatest bearing dependability is said to be assured.

As will be seen from Fig. 7, the drive to the two camshaft drive shafts is through a vertical shaft driven off the end of the crankshaft. On an extension at the upper end of the vertical shaft a coupling is provided for the magneto drive, while gears are provided approximately half way up the camshaft drive shafts for the gun synchronizer drives. From the under side of the

crankshaft gear the drive for the single-unit oil, fuel and water pump is taken off through an Oldham coupling, the short shaft being journaled in the rear bearing cap. All drives are completely enclosed, and there are no projections on the rear of the engine, which simplifies installation in the plane.

A feature of the single pump unit is that the whole device can be quickly detached without disturbing other units, and that it can be used interchangeably on both engines. The pump combination contains three spur gears, which are arranged to form the two oil scavenging pumps, and these gears in turn each drive another unit.

Total Weight of Unit 16 Lb.

The first gear of the group drives the water pump, the second the fuel pump and the third the oil pressure pump. The total weight of the entire unit, including the oil strainer and relief valve, is 16 lb.

Any of the engines can be fitted with one or another of three available ignition systems—whichever appears best in connection with the particular service in which the plane is to be used. All of these systems can be adapted to the different engines with only minor changes to the rear thereof. The systems are as follows: (1) A double magneto located in the Vee and provided with two independent distributor drives (this arrangement was described in a previous issue of *Automotive Industries*); (2) Two twelve-cylinder magnetos carried on a horizontal bracket bolted to the rear of the crankcase, and (3) A battery-generator system comprising two distributors mounted in an inclined position at the rear of the engine and a generator mounted vertically in the Vee or placed horizontally at the rear of the crankcase.

The magnetos of the first two systems referred to are of either Scintilla or Splitdorf manufacture, while the elements of the generator system are furnished by Delco. There is quite an advantage in being able to equip an engine with alternate forms of ignition apparatus, as in certain cases a single battery can be used to furnish current for radio and similar purposes and also for ignition, whereas when no current is required for other than ignition purposes a magneto may be used, a considerable saving in weight resulting in both cases.

Two Stromberg Carburetors

Two Stromberg carburetors are placed in the well between the banks of cylinders and feed three cylinders in each bank through a cross header. Improvements recently made in the distributor drives make it possible to remove the two carburetors, manifolds, air intakes, altitute controls, and connecting gasoline lines from the "Vee" as a unit, thus simplifying assembly and dismantling operations. Application of exhaust heat to the intake manifold has improved acceleration with a cold engine, increased the economy at cruising speeds and eliminated snow formation on the throttles. The head is led through a passage from the exhaust chamber in the valve housing and encircles the entire cross passage leading to the cylinder intakes. The supply of heat varies inversely as the throttle opening, being controlled by the vacuum existing in the intake manifold.

All gas and oil leading from the engine terminate at the crankcase in a fitting by which the end of the line is positively secured to the engine structure. This provides a definite place where the plane manufacturer connects up the pipes leading from the engine. In the past it has been customary to leave the ends of the lines free. This arrangement relieves the engine builders of all responsibility for pipe breakage between the engine and the rest of the plane.

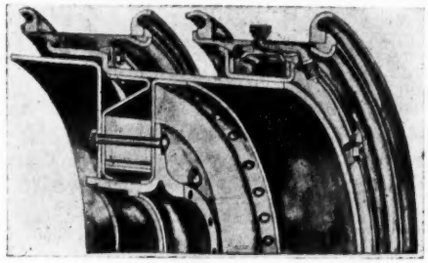
As previously mentioned, both engines are provided with reduction gears. These are furnished by the Allison Engineering Co. of Indianapolis and are of the spur gear, single-reduction type and entirely self-contained. Inserted between the crankshaft and the pinion is a shock absorbing device. The gear carrying the propeller shaft is supported on roller bearings fore and aft, the thrust of the propeller being taken by a ball thrust bearing immediately in front of the gear. The pinion is also carried on two roller bearings. On the direct drive models propeller thrust is taken by a flange on the crankshaft just ahead of the first main bearing, supported by a ball thrust bearing.

As the cylinder barrels project a considerable distance into the crankcase, the No. 1500 engine can be run satisfactorily in the inverted position, there being no chance for any excess oil to run down into the inverted cylinders. Very few mechanical changes are necessary to convert this engine for inverted use. The pumping unit must be reversed in position so it comes at the bottom of the engine approximately in line with the heads of the cylinders, and the carburetors must be rearranged.

On the latest engines the sheet aluminum cover over the valve mechanism is made to serve a dual purpose. It forms a cowling which covers the units located in the "Vee" of the engine and extends down the front to the crankcase. This covering greatly improves the stream lining of the engine, and where powerplants are mounted outside of the fuselage, as in the case of twin engine planes, it is not necessary for the plane manufacturer to provide any extra cowling for the engines.

Indestructible Dual Wheel

A NEW dual pneumatic wheel for use on buses and trucks has been put in production by the Indestructible Wheel Company of Lebanon, Ind. The new wheels are constructed to carry the well-known makes of demountable rims. The web or center of the wheel proper is made of a stamping from a special rolling of high carbon steel. A master felloe, of special rolled high tensile strength steel, is placed on this stamping. By the use of this specially constructed felloe band the maximum diameter of brake drums on small tire seat diameter of rims is allowed. The fact that the load line of the wheel passes through the center of the hub and no great amount of offset is needed in a dual wheel is claimed as an advantage of this type of construction.



Section of new Indestructible dual pneumatic wheel for trucks and buses.

The wheels are made to fit standard axle hubs, making it possible to economically fit these wheels to standard production hubs. Both demountable rims are mounted on the master felloe bands. The inside rim is mounted directly on the master felloe band with standard wedge rings, clamps and nuts, as is done with single tire wheels. The outside rim is mounted on the demountable felloe band which is split to give the proper holding facilities to seat the rim on the wheel by clamping the rim to the felloe. Each rim may be removed separately by this method of mounting. If the outside rim is removed it is not necessary to disturb the inside tire.

Just Among Ourselves

Light Cars and Small Cars Still Create Interest

TALK about an American-built light car starts up every now and then, dies down for a while and then begins to go the rounds once more. "Light car" is not an entirely accurate descriptive term, but usually refers to jobs of the 6 hp. to 12 hp. type common in some European countries. Whatever may be the exact meaning of the term "light car," it might not be extravagant to hazard the guess that among the spring announcements this year there will be found at least one small four-cylinder car of somewhat unusual design.

* * *

Gasoline Taxes Cost Car Owners $9.22 Apiece

AUTOMOBILE drivers last year paid an average of $9.22 apiece in gasoline taxes; average gasoline consumption per vehicle was something like 430 gallons. Every state now has a gasoline tax except Illinois, Massachusetts, New Jersey and New York. Average rate of tax is 2.26 cents per gallon. Arkansas and North Carolina collect 4 cents on every gallon; that seems like a pretty good-sized percentage. Gasoline taxes seem like a pretty reasonable method of taxing people for the use of roads; trouble is the same people get taxed for the same purpose in two or three other ways in a good many instances . . . Mustn't forget to credit Bureau of Public Roads as source of above figures.

* * *

Possibility Always More Than Reality

WE'VE been an ardent advocate of facts as the only sound basis for making decisions and of the ground-gripper type of mind as perhaps the chief factor in industrial and technical progress. While still adhering to our belief in this connection, we feel an urge to point out that knowledge of existing facts, when permitted to act as a Chinese Wall for the mind, probably inhibits progress more than does the fantastic dreamer who guesses and hunches about the future without any knowledge at all.

The man who permits a fine knowledge of existing facts to make him highly skeptical of the possibilities for future development may actively hinder progress; the illogical dreamer merely doesn't help it—and he might hit upon a good idea by chance, at that. Analyzing the Chinese mind as compared to that of the Westerner, a modern philospher writes: "At the back of the Oriental stand legends and fairy-tales; they represent more insofar as possibility is always more than reality." The understanding that "possibility is always more than reality" is essential to maximum future progress in automotive technical and marketing lines. Knowledge is a necessary basis for progress, but flexibility of mind and imagination are essential in building the progress out of the foundation of knowledge.

* * *

Self-Regulation in Business

U. S. Chamber of Commerce is going to have "Self-Regulation in Business" as the central thought of its annual meeting this year. Sessions are to be May 11 to 13; the place Washington as usual. Seems like a good topic. It advocates the sort of activity which Herbert Hoover has been urging on American business ever since he became Secretary of Commerce. Experience has proved that industrial and business concerns must be run fundamentally in accord with the needs and interests of the public if they are to precede serenely on their way over a long period of years. Regulations comes to those who fail to exercise sufficient self-regulation. And self-restraint can be applied with so much less friction than outside restraint. Not a new topic, to be sure, but one still needing emphasis.

* * *

Oakland Boss Becomes "Heap Big Injun Chief"

AN Indian chief is now president of one of our important passenger car companies. Yeah, honest! W. R. Glancy, head of the Oakland organization, was officially made Chief Pontiac by the Algonquin Nation when on a trip to the Pacific coast recently. The honor was conferred on him in recognition of the Pontiac car having been named after one of the most illustrious chiefs of the Algonquins, Pontiac being the only car name, by the way, commemorating the American Indian. The ceremony took place with the utmost secrecy in a secluded spot in Monrovia canyon and, according to all accounts was a dignified affair. Mr. Glancy is the second white man so honored by the Algonquin Nation, which has preserved its identity through some three hundred years. Once its headquarters were on the banks of the Ottawa River in Canada, but the white man gradually pushed it westward. In the 17th century it embraced such powerful tribes as the Delawares, Cherokees, Abenakis, Chippewas, Ottawas, Senecas, Pottowatomies, Sacs and Foxes. Those who have never attended any automotive conventions nor heard a paper on "The Development of Motor Transportation" will be interested to know that the Indians originally used only the crudest form of transportation relying on animal-drawn wheelless vehicles. Later came the development of the wheel and . . but is there anybody who hasn't?

—N. G. S.

Higher Car Speed, 4-Wheel Brakes Increase Body Strains

New problems confronting body builders, says British engineer. Stresses imposed on body depend largely upon degree of rigidity of frame. Three-point suspension best.

HIGHER car speeds, faster acceleration and deceleration, the latter due to the introduction of four-wheel brakes, have intensified the problems of the body builder, especially in connection with closed cars, which now constitute the bulk of the production.

The stresses which are imposed upon the body depend to a considerable extent upon the degree of rigidity of the frame and upon the method of attaching the body to the frame, hence the chassis engineer and the body engineer have mutual problems, and these were interestingly discussed in a recent paper on "Modern Chassis Frame Design and Body Mounting," read before the Institution of Automobile Engineers, London, by T. D. Carpenter.

In the introduction Mr. Carpenter says the object of the present day automobile is to transport passengers with maximum comfort and at minimum cost; he implies that these are conflicting requirements and observes that it is not easy to determine how these features should be proportioned or how they should be weighed against each other.

Chassis Frames in Four Classes

Chassis frames may be divided into four classes on the basis of their degree of flexibility, as follows:

(1) *English style* of chassis-frame construction, permitting a moderate amount of distortion to the side members. (Examples: Rolls-Royce, Lanchester.)

(2) *Continental style* of heavy construction—deep-section frame and cross-members. (Examples: Fiat, Renault.)

(3) *Continental style light construction*, narrow-section frame permitting considerable distortion in all directions. (Examples: Minerva, Mercedes.)

(4) *American frame construction* follows Continental rather than English practice. (Example: Packard.)

The main function of the frame is to support the engine and transmission units; to afford suitable anchorage for the springs and axles, and to provide a platform for the accommodation of the body. For the purpose of this survey, the power plant and its various adjuncts in relation to the frame has been disregarded, as it is only proposed to consider the frame in relation to the body. The paper also deals mainly with the largest type of car of 12 to 13-foot wheelbase, and of 30 to 50 hp. The problems facing the light-car builder, while perhaps more difficult, would cover too wide a field, and also have to be approached from a somewhat different standpoint.

The large chassis to which a fairly heavy body is usually attached, may be expected to impart considerable rigidity to the base of the latter. In service, the high maximum speed at which the car may travel will tend to produce large alternating stresses in the whole structure.

The average British chassis is designed for use mainly on English roads, which are admittedly excellent, and the frame, while permitting reasonable distortion, serves to keep the whole structure fairly rigid. If a stripped chassis-frame be raised at one corner by a jack, a considerable distortion occurs in the frame member, which recover when lowered. When the same process is undertaken with the body in position, the natural result is to distort the upright pillars, and doors and windows fail to open until the artificial stress is removed.

A similar process is constantly occurring in service, and severe reversal stresses are communicated to the body structure, which resists them to a reasonable extent and it may be considered that the life of a body is proportional to the success with which it can withstand this usage.

Let us consider the average Continental chassis designed admittedly for high speeds over bad roads. We find in most cases that the frame section is heavier and stiffer than the corresponding British type, while the average body is also heavier. This leads to the conclusion that the French and Italian builders have attempted to gain rigidity at the expense of weight. The latter statement is only partly true, however, as a comparison of various makes shows that whereas the general tendency is for a heavier construction than the British the exceptions are in some cases lighter and more flexible. The reason which has led the designers to adopt these apparently divergent principles is not obvious.

American practice seems to show a tendency to provide greater frame stiffness than British, while the rigid metal body, either cast or built up partly of castings and pressings, is finding considerable favor. It seems that an all-metal body would be rather less flexible than a corresponding wood and metal structure, although the former would perhaps last longer without disintegrating.

Degree of Rigidity a Question

From the examples quoted, it would appear that there is a fairly wide divergence of opinion regarding the degree of rigidity necessary in the frame. The author considers, however, that whatever arguments may be advanced in favor of flexible frame members, the stiffer frame is better for the body. This is more particularly true when an all-weather type of body with collapsible top is considered. In this case the rigidity of the body is entirely dependent on the stiffness of the base. Any tendency of the latter to sag or take a permanent set will at once throw the doors and head-mechanism out of adjustment, as to counteract this there are no rigid struts above the elbow line.

A consideration of present methods of body mounting will show that many attempts have been made to vary

the early practice of bolting the body-base directly to the steel chassis-frame. Since distortion is bound to occur, methods have been devised, more or less successfully, to prevent the whole stress from being communicated to the body, but no general practice is followed.

The principal methods may be summarized as follows:

(1) Rigid attachment of body to chassis-frame and dash. (American and Continental practice generally.)

(2) Semi-flexible attachment; rubber or felt packing between frame and body bearings and dash. (General English practice.)

(3) Four-point attachment of body to chassis with intermediate flexible bearings. (Example: Lanchester.)

(4) Four-point attachment of body built on suitable sub-frame of sufficient strength to resist stresses imposed by road shocks, but entirely isolated from chassis-frame except through four bearings. (Example: Daimler.)

It will be noted that the rigid body attachment is generally used in conjunction with a deep-section frame, thus serving to produce a very rigid unit. The greatest difficulty that has to be met, once any form of flexible attachment is fitted, is to insure that the two units have sufficient, but not too much, relative movement to each other, and the author is inclined to prefer to build up the stress in the body, rather than to shake the body to pieces owing to too slack a connection.

Packing Strips May Squeak

Felt or rubber packing strips inserted between the body and the frame serve to absorb vibration, but unless bolted down firmly, the slight movement between the two surfaces tends to produce squeaks of annoying persistency. Similar strips are often inserted between the dash and the body framing, but here again the amount of movement which can be successfully absorbed is very small. A better arrangement is obtained by bolting the body directly to the frame, leaving the dash framing entirely clear. This permits considerable lateral distortion of the bonnet and dash to occur without stressing the body scuttle, and as the maximum bending moment of the frame generally occurs in the vicinity of the dash board, it appears a good plan to provide complete isolation at this point. The Lanchester four-point suspension gives good results in practice, and does not require an unduly heavy bottom side framing. In this scheme, the body is carried on four cups bolted to the frame, in which are inserted rubber washers. A bolt passes through the body and the cup, and when tightened the rubber is compressed. The main advantage secured by this scheme is that the rubber washer, being in a cup is prevented from expanding laterally, when compressed, so that although a slight flexure is possible in the housing, there is no tendency to float laterally, as would occur if the rubber had no lateral support. Additional circular flat washers inserted between the top of the frame and the body cross-bars afford support should the body tend to sag in the center, but do not prevent a slight movement occurring. A similar type of fixing is on the market, incorporating eight cups carrying spherical rubber balls through which the body is bolted. It is not very apparent what advantages this method possesses over any flexible-strip insertion, as the body is secured at too many points to afford much movement. It is, however, found fairly effective in absorbing engine vibration.

The Daimler type sub-frame would at first sight appear the most ideal form of construction. In this case, the body is built on a sub-frame of such strength that it does not require additional support from the chassis, to which it is attached at four points only—two at the front, and two at the rear.

Ample compensating movement is allowed between these fixings for independent distortion, so that the stresses are not communicated to the body. It has, however, been found in practice that this scheme permits of too large a relative movement between the units. Although distortion stresses are not communicated, the mass weight of the body tends to move out of harmony with the chassis, thus stressing the connections and unduly straining the body, which tends to shake to pieces. In later designs this system has been modified, and the connections are made quite rigid at four points; the dash is still left free, and the steering column is clipped to the cowl. This materially improves the riding, and the author has tried the further effect of fixing the cross-members of the body-frame to the chassis by four additional bolts, which in his opinion improved rather than decreased the riding comfort.

Follows Continental Practice

It may be of interest to note that the effect of these later modifications is to follow closely the rigid Continental scheme. The stiffness of the body when built on a channel-section sub-frame added to the strength of the chassis frame proper produces a very solid foundation—at least as stiff as any French or other production on the market.

Reference might, perhaps, be made to a French invention wherein the body is supported by four or more helical springs each side. The author has not had an opportunity of testing this scheme, but is inclined to think that it would be too unstable and should be regarded as the exception to, rather than the rule of, Continental practice.

From the four schemes described, it is evident that there is a limit of flexibility which, if exceeded, detracts from, rather than improves, the riding and wearing qualities of the car.

We have so far considered only the advantages or otherwise of rigid and semi-rigid attachments in relation to wear on the body. We must, however, also consider the effect obtained by the elimination of transmitted engine vibration and road shocks on the comfort of the passengers. If we could isolate the body from the chassis by an air cushion at low pressure, we should probably be able to absorb all purely engine and transmission vibrations. As this is quite impracticable, the next best substitute must be adopted. Solid soft rubber bearings moderately compressed are quite effective, but it is difficult to obtain sufficient rigidity in the fixing to satisfy our first conditions without nullifying the advantages of the soft bearing by undue compression.

Torque Reaction Devices

As already stated, attempts have been made to support the body on compressed helical springs, but although this might prove quite a useful system on good roads at slow speeds, any undue rolling would probably cause too much movement, and the whole structure would become unstable, and inclined to bounce and roll laterally. It is the author's opinion that anti-vibration devices between the body and the chassis are likely to prove more troublesome than useful. Efforts in this direction should take the form of torque reaction devices fitted to the engine since it is admittedly far better to place the damper as close to the source of the energy as possible, rather than to expect much effect from any half measures that the coachbuilder may devise.

We must now consider the methods in vogue in body construction to eliminate or minimize the admittedly unpleasant sensation caused by engine vibration. For the

purpose of comparison, bodies have been divided into three classes:

(1) *Non-rigid bodies.* (Weymann principle.)
(2) *Semi-rigid bodies.* (Cloth-covered panels, but rigid framing.)
(3) *Rigid bodies.* (Rigid framing and panels throughout.)

The non-rigid or Weymann principle is being rapidly developed in France, and is making definite headway in England. The scheme provides for a wooden frame on which are placed the seats and cushions. The frame is bolted directly to the chassis. The superstructure is erected and attached to this wooden frame by small right-angled spring plates which allow the upright framing pieces to move, in other words, the right-angled frame can "lozenge" owing to the provision of flexible corners. This necessitates covering the framework with fabric instead of wood or metal. The advantage of this is again apparent, since a flabby drum will not magnify sound to the same extent a well-tensioned one, and Weymann bodies are remarkably free from drumming.

Appearance Not the Best

Although vibrations can be carried from the chassis and floor up the pillars, there is little tendency for these to be amplified in an unpleasant manner, while the vibration transmitted to the cushions is readily absorbed by the springs of the upholstery. The sole disadvantage found with the Weymann body is that its appearance does not compare favorably with the finish obtainable on a painted metal panel, or, as the author once heard the case expressed. "Some people live in tents and are satisfied; others prefer houses." He can hardly agree entirely with this statement, since a tent appears to have all the disadvantages but none of the advantages of a house, except cheapness; whereas the Weymann body with one exception—appearance—possesses most of the virtues of a good car.

Examples of bodies called "Semi-Weymann" which seek to obtain some of the advantages of leather covering while retaining the conventional framework of rigid type, are fairly common. In some cases, the lower parts are panelled in metal, and leather covering is used for the upper portion only. While some "anti-drumming" advantage may be obtained from the fabric covering the squeaks and rattles inherent in all rigid-frame bodies cannot be entirely eliminated, and the scheme generally is not really so good as the true Weymann or the rigid-panelled body.

In the author's opinion, the rigid framed and panelled body is the best type for permanence and appearance. It is the most costly, but when carefully built, with perfectly fitting doors and windows, and attached to a chassis-frame of adequate strength, it provides maximum comfort and service.

Compromise is Necessary

The question arises: Should the automotive engineer attempt to isolate the passenger more adequately from noise and shock, or only attempt to prevent the amplification of noise, and to isolate the car as a whole from road shocks by means of tires and springs? The author is of the opinion that perfect suspension of the chassis only should be aimed at by means of the springs and shock-absorbers. Admittedly, a compromise must be effected, since it is essential to deal with a variable load of from three persons to, say, seven persons with 2 cwt. of luggage, i.e., a variation of approximately 800 lb. The riding cannot be perfect at both ends of the scale, but it is a fact that many cars on the road today ride badly through the whole range of loading.

This lack of comfort is generally looked upon by the average owner as of much more importance than high maximum speed, acceleration, and chassis performance generally, and the author would urge that more consideration be given to this matter by chassis manufacturers than is sometimes the case. A car is more often condemned by a prospective purchaser because of bad springing and shuddering than because of inferior engine performance. It appears possible to express springing problems in mathematical terms, but unfortunately, it is not so easy to put the results so obtained into practice.

Low-pressure tires undoubtedly improve the riding comfort, but whether this is true at all speeds and on all cars is a matter of opinion. The author is inclined to think that there is a growing tendency to utilize balloon tires to cover up the delinquencies of the springs.

Although almost every large car is now fitted with four-wheel brakes, coachbuilders have not, as a whole, been able to gather many data regarding the stress imposed upon bodies by this system.

When used with the same care as is usually exercised with the two-wheel system, no great increase in stress is likely to be thrown on the body structure, but while the advantages of being able to stop quickly in an emergency are admitted, there is a definite tendency to drive faster and to take risks which would not be taken with two-wheel brakes.

However great may be the thrill to drive up to cross-roads at 30 miles per hour and stop dead within twice the length of the car, it cannot but result in harm to the mechanism and body generally after two or three years.

From observations on closed bodies it has been found that owing to the increased stress there is a tendency for the joints between the pillar top and roof framing to become loose. The usual system of fixing with a mortice joint and pin has proved inadequate, and other means have had to be devised to strengthen these parts. The carrying of luggage on the roof will, if sharp braking is resorted to, considerably aggravate the trouble, and heavy luggage should never be carried in this position.

Damage Caused by Stress

An instance was brought to the author's notice in which an extension hood had collapsed owing to fracture of the main sticks. This had occurred when the hood material was wet and heavy, and the sudden strain when braking had been too great and the whole structure had collapsed in a forward direction.

The author does not wish to labor these points unduly, but it will, he thinks, be generally agreed that the problems confronting the coachbuilder today are at least as great as ever, and appear likely to increase. The higher speeds and the greater acceleration and deceleration possible on modern chassis will continue to impose increasing stresses upon the bodywork.

Many advantages would, no doubt, be gained if it were possible to design a satisfactory three-point body suspension, two in front and one at the rear. So far, the author has seen no attempt to do this, and is not prepared to say how it could be done.

The nearest resemblance to the idea on a chassis is obtained by the side and cross spring suspension but this scheme has largely fallen into disuse. It has, however, some advantages over the more popular cantilever system—not the least being that it is necessary with a cross spring to provide adequate anchorage at the rear of the frame, which in turn supports the body.

It also tends to minimize that uncomfortable "roll" which is too often a characteristic of cantilever suspension.

New Type of Recording Amplimeter is Used on Precision Balancing Machine

Pointer becomes stationary at maximum reading of instrument, enabling one operator to tend several machines.

OPERATION of the Precision balancing machine made by the Gisholt Machine Co. of Madison, Wis., has been simplified by the recent adoption of a new type recording amplimeter. With this instrument it is no longer necessary for the operator to watch the instrument closely in order to determine the amplitude of vibration and hence the amount of material to be removed to obtain balance. Consequently two or more machines can be operated by the same man. All current production is being fitted with the new instrument, which also is available for machines already in use.

As illustrated by Fig. 1, which shows application to the new wheel model machine for flywheels, clutches, disks, etc., the recording amplimeter is mounted on the regular standard at the head of the machine. A fine steel wire which is stretched between the frame of the machine and the amplimeter transmits the vibrating movement of the former to the mechanism of the instrument.

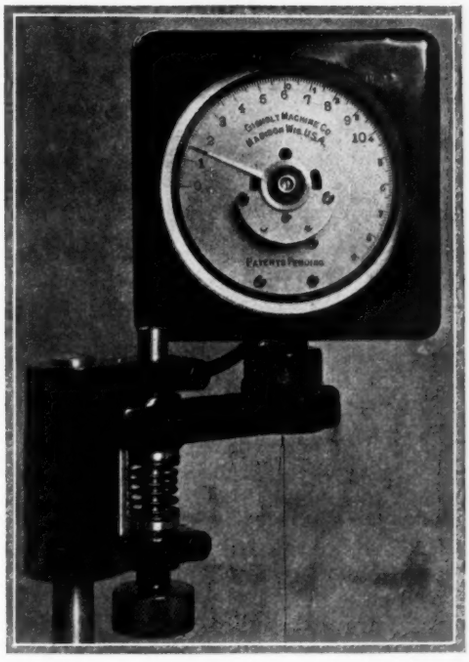


Fig. 1 (above): New recording amplimeter applied to precision balancing machine for disk, flywheel and similar work

Fig. 2 (at right): Pointer near large figure 7 oscillates in step with vibratory motion of frame of machine, while pointer at left records maximum oscillation, eliminating necessity of close attention

As shown in Fig. 2, the case of the instrument encloses a circular dial which is scribed in two sets of concurrent divisions. One indicator hooks over the edge of the dial and centers at Fig. 6 and 0. This indicator is mounted on jewels and oscillates both ways from the zero mark adjacent to Fig. 6 to show the amplitude of the frame's vibratory movement at the moment of observation. By itself, the upper indicating pointer approximates the work of the former indicator.

Through the internal mechanism of the instrument, the oscillation of the upper indicating pointer is transmitted to the indicating hand shown at the left. When the machine is in operation, this pointer advances by increments until the reading corresponds to the maximum oscillation of the upper pointer. The pointer at the left remains at this position, although the machine may have stopped meanwhile and after observation can be set back to its zero reading manually.

Maximum Reading Recorded

This feature permits the operator to give his attention to other machines and then return to find the maximum reading, which in many cases is more accurate than can be determined by his observation of the oscillating indicator. By means of a chart prepared for the specific job, the reading of the recording pointer is translated directly to the amount of stock which must be removed for correction.

Two small electric bulbs concealed within the case of the instrument illuminate the dial and allow the balancing machine to be placed at any point within the shop regardless of the conditions of exterior illumination. Throughout the design of the instrument, provisions have been made to reduce friction and jewelled bearings, etc., are used extensively.

IN the quarterly report of the statistical department of the Swedish Government it is stated that the world's output of ball bearings is approximately 200.000 a day.

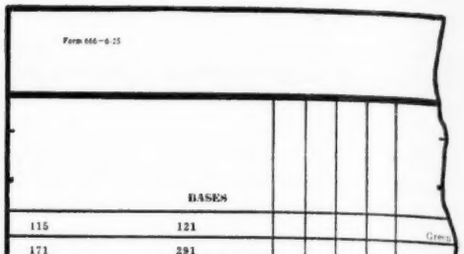
GENERAL OFFICES
YORK, PA.

Martin-Parry
CORPORATION
YORK ASSEMBLING PLANT
YORK, PENNA

FACTORIES:
YORK, PA.
INDIANAPOLIS, IND.
LUMBERTON, MISS.

Invoice No.
Order Entered
Your Order No.
Our Order No.
Date Shipped
Salesman
Terms
Shipped Via
Car No.

Quantity	Cat. No.	DESCRIPTION	Price Each	Total



BASES							
115	121						
171	291						
120	684						
All 200 Series	685						
All 300 Series	688						
420-421-430	689						
421-422	898						
427	5010						
Sub Sills	1113-X						
228-238	650						
423-424-425-428	950						
Sub Sills	939-X						
Ford Extension	951						
Sub Sills	950-X						
426-429	952						
Sub Sills	981-X						

Fig. 1, above: Retail sales slip which is made out for each Martin-Parry branch sale and copy forwarded to the home office in York, Pa.

Fig. 2, left: The Martin-Parry "breakdown" sheet on which weekly sales by models are expressed in terms of component parts

Body Builder Solves Distribution by Complete Standardization

Martin-Parry operates on national basis by close control of all retail outlets and simplification of designs to minimize shipping costs and inventories.

By K. W. Stillman

ANY concern which attempts to sell commercial bodies on a national basis has very strong competition to meet. In nearly every community there exist local body shops, carpenters who are skilled in body work, and other artisans who not only personally know the butcher, the baker and the candlestick maker, but who often can supply custom-built bodies to the community for very low prices.

In entering such a field a "foreign" corporation competes with the feeling of local pride in home industries and so is compelled, in order to obtain any substantial proportion of the available business, not only simply to meet the offers of the local builders in the way of price, quality and service but to beat them sufficiently to overcome the natural desire of customers to buy from their neighbors and friends.

Some of the important features of one system of distribution which has been used successfully to meet this competition are: Close factory control of some 40 branch inventories; weekly check-ups on branch sales and weekly replacement shipments; keeping all records in terms of standardized, interchangeable, unit component parts; packing methods which double the usual number of bodies which can be shipped per car; standardization of packing, unpacking and entire branch operation.

Employment of a distribution system based upon these features has enabled the Martin-Parry Corporation, makers of commercial bodies for Fords, Chevrolets and similar small chassis, to obtain national distribution of their products in spite of strong local competition in nearly every territory and high freight rates which constitute from 30 to 35 per cent of the selling price. Back of this distribution system and contributing largely to its success is a well developed production program in which standardization plays an important part.

One of the first steps in the campaign to win over these local markets was the decision to use branches instead of independent distributors. This decision was based on the necessity for complete supervision over the retail outlets in order that the highest quality of service could be assured to customers. Some 40 branches have been established throughout the country and they are all controlled completely from the home office.

Each branch is, in reality, not only a distributing point but a part of the factory organization as well. In fact, the branch is run by a Branch Supervisor who reports to the General Branch Manager while the salesmen are quite separate from it and are directed by District Sales Managers who reports to the General Sales Manager.

Each branch is equipped not only to assemble the units it receives from the factory into any model of body desired but it also is capable of performing a considerable

range of other kinds of body work, including the construction of equipment to adapt a body for special purposes, painting and lettering, and all sorts of repairs. Because of this it is possible for the branches to sell a body which is complete in every detail for the particular service it is to enter.

Another reason for preferring branches is that they can be made to carry a few slow moving units which might be needed to fill an order quickly. Thus the company advertises the idea that any of its 53 bodies can be obtained immediately at any of its distributing points. Obviously all of these types are seldom demanded in a single territory. In each territory a few types are in fairly constant demand with infrequent calls for the others. With the standardized interchangeability of parts which has had such a strong influence upon the success of the distributing methods used, it is necessary to carry only a few extra parts in order to meet the demands for any type of body.

DAILY SALES—WEEK ENDING

BRANCH

Model					Total	Model
120-A-Green						423-A
120-B-Green						423-B
120-C-Green						423-C
120-A-Wine						424-A
120-B-Wine						424-B
120-C-Wine						424-C
220-A-Green						425-A
220-B-Green						425-B
220-C-Green						425-C
220-A-Wine						426-A
220-B-Wine						426-B
220-C-Wine						426-C
221-A						427-A
221-B						427-B
221-C						427-C
222-A						428-A

Fig. 3. Summary sheet for recording daily branch sales by body models

Stocking these few slow moving parts is necessary in order to insure the keeping of the universal delivery promise and there is no difficulty in keeping branches so supplied. An independent distributor might object to tying up even a small amount of his funds in such stock.

An essential element in obtaining profitable operation was the reduction of the many branch inventories to the minimum amount required to give complete and satisfactory service to customers. To do this, both simplification and standardization of design was utilized. Each body type was analyzed for superfluous parts, or parts which could be combined with others to simplify the construction of the completed product. When this had been completed each part used was studied in relation to the same part used on other types to determine if a standard part could not be designed which would be satisfactory for a number of different types.

175 Units Instead 765

This latter activity has been carried very far. Fifty-three distinct types of truck bodies are carried in the complete line. Two of these are entirely special. The remaining 51 are built up of standardized parts. Each body contains a minimum of 15 unit pieces so, with unstandardized designs, at least 765 different units would be necessary to construct one body of each of the 51 types. With standardized designs only 175 units are needed to do it.

This, of course, permits a marked saving in the amount of materials which must be stocked by the branches. Windshields and seat cushions, for example, are the same for all types of bodies. Obviously then the branch stock of these items need be but a small part of that needed if each type required a different unit.

A necessary part of this program was the installation of production methods which would insure complete interchangeability of the units. With wood as the main item of material used, this appeared to be a difficult problem, but it was plain that if it became necessary for branches to do a lot of cutting and fitting before they could assemble a body many of the advantages of standardization would be lost.

Such production methods were installed and the universal use of jigs in all operations insured interchangeability. The degree to which this has been attained was evidenced by a rather spectacular shipment to Japan shortly after the recent earthquake in that country. An order for 1000 bodies was filled from three shipping points. Bases were shipped from Lumberton, Miss., through New Orleans. Curtains and various accessories were shipped through Philadelphia from York, Pa. Other body parts were shipped through New York from Indianapolis. The three shipments met for the first time in Japan and the 1000 bodies were erected with every part fitting perfectly and with no shortages of materials.

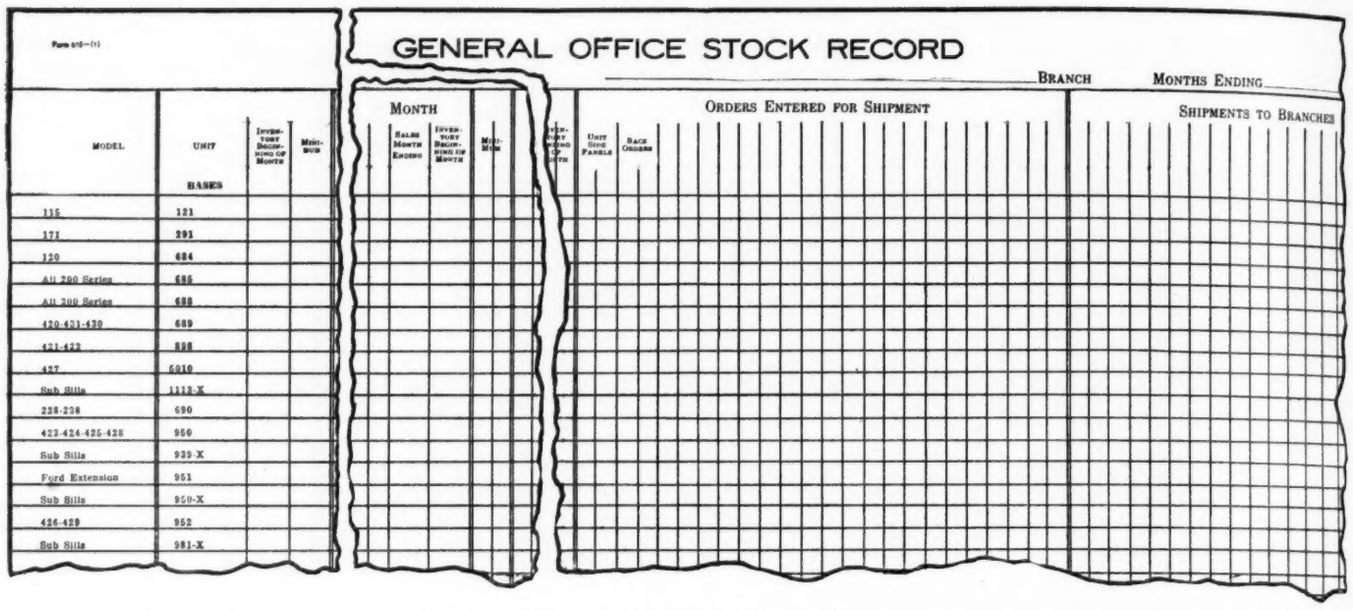
Control From Home Office

Although this standardization program permitted an inventory reduction of at least 50 per cent over that necessary otherwise, the company believed that still further advantages might be obtained by exercising control over the branch stocks from the home office. So, contrary to usual practice, the branches have practically no voice in what is sent them from the factory, they do not know what their inventory is in terms of complete bodies and all the work of estimating their future sales and keeping their inventory in close relation to sales is handled from the home office at York.

The necessary stock for any branch is considered to be one month's sales. When a new branch is to be opened past sales records are studied to determine how many sales have been made in the territory which the new branch will include. These sales as well as all other sales and production information are in terms of component parts and not in terms of complete bodies. Retail sales are first reported as complete bodies sold. This report is immediately broken down into the component units making up the body and all subsequent records, production and shipping orders are expressed in terms of these component units.

The new branch is set up with a stock approximating the number of units which, according to past sales, it should dispose of monthly. The stock is stored in accordance with a standardized plan effective in all branches and every activity of the branch has been planned in advance, tested in an experimental branch at York, and complete instructions and equipment provided so that it may be carried out in the best possible fashion.

The first customer enters the branch and asks for a certain type of body listed in the catalog. The branch men are provided with a material list showing just what units are required for such a body and they are quickly assembled from the racks in which they are carried. Each step in assembling these units has been covered by instruction sheets so that the work can be performed most efficiently.


GENERAL OFFICE STOCK RECORD

BRANCH MONTHS ENDING

MODEL	UNIT BASES	INVENTORY BEGINNING OF MONTH	MINIMUM
115	121		
171	291		
120	684		
All 200 Series	686		
All 200 Series	688		
420-421-420	689		
421-422	888		
427	6010		
Sub Sills	1112-X		
238-236	690		
423-424-425-428	960		
Sub Sills	939-X		
Ford Extension	951		
Sub Sills	950-X		
426-429	952		
Sub Sills	981-X		

MONTH — SALES MONTH ENDING | INVENTORY BEGINNING OF MONTH | MINIMUM | INVENTORY ENDING OF MONTH

ORDERS ENTERED FOR SHIPMENT — UNIT SIDE PANELS | BACK ORDERS

SHIPMENTS TO BRANCHES

Fig. 4. Branch inventory record kept by home office force and to which are posted component part sales as determined from breakdown sheet (Fig. 2)

The sale is recorded on an ordinary type of retail sales slip, one copy of which is forwarded to the home office (Fig. 1). Each week all the sales slips from the branch are posted to the branch inventory account (Fig. 4) and necessary replacements orders (Fig. 5) sent to the factory. The sales slip records the fact that a certain number of bodies of a certain type have been sold. The first step taken at the home office is to express these sales in terms of units (See Fig. 3); that is, instead of posting the branch inventory record with so many bodies sold the fact is recorded that a certain number of unit pieces have been taken from the branch stock and must be replaced.

In determining when replacement shipments should be made to the branch, a minimum quantity is set for each item. This quantity is based on the fact that the usual cycle from the time a sale is made by the branch until a replacement shipment can be received is about 18 days. In emergencies, of course, this time can be cut to the period needed for actual freight movement. In practice these minimum quantities are not utilized fully but shipments are based on the policy of always keeping the branch stock as nearly as possible equal to one month's sales.

Shipments in Carload Lots

The important factor in scheduling shipments is the desire to ship in carload lots. Thus each week one or more carloads of units will be shipped to the larger branches to replace the units sold the week or two previous. For smaller branches, if replacement of the week's sales will not make a carload the replacement shipment may be held over for a week provided none of the inventory items has been reduced below the minimum. If the minimum has been exceeded the action taken follows determination of the relative advantages of shipping the needed parts in less than carload lots or overstocking the branch to the extent of making a full carload shipment.

With such close control over branch inventories it is evident that investment in stocks can be kept at a minimum without losing the flexibility which permits the stock to be expanded or contracted quickly to meet local conditions.

The replacement order is forwarded to the factories and almost invariably within three days after its receipt the order has been filled from the factory stock and the shipment is on its way to the branch.

How the factory is enabled to have sufficient stock on hand to fill all orders so quickly is another story and can not be given here in full. Briefly, factory operations are based on quarterly programs which are set up by the management. Sales for a three-month period are estimated and a production schedule based upon this estimate is given to the factory. The factory starts on this program with every assurance that there will be no changes of design or any other interruptions until the cycle of three months has come to an end.

Packing is Simplified

Packing and shipping methods have been developed which contribute greatly to the success of the distribution system employed. Because of standardization each unit piece is exactly like every other. Any side panel, for example, will fit perfectly any base, tailboard, cab, etc., of any body for which it has been designed. When this interchangeability is not present each piece must be always used in a particular place and in a particular relation to adjoining pieces or it will not fit. Because of this the various components of such a body must be kept segregated and in shipping them it is necessary to crate them so that they will not become mixed.

This is unnecessary with Martin-Parry methods for the entire interior of a freight car can be filled with pieces packed to take up the least amount of room. The various items are "nested" in the car with such a saving of space that units for 30 or 40 complete bodies can be shipped in a single car—just about twice as many as can be crammed in when the parts are similarly knocked down but crated. The effect this has upon the unit freight cost is obvious.

Packing and shipping methods have been standardized to the same degree as all other operations. Detailed instructions are provided for the packers so that all cars shipped from the factory are packed in exactly the same way in-so-far as they contain identical items. What this means in shortening the time of packing and unpacking is readily understood, but possibly its greatest value is in preventing damage to shipments. The company established a record a short time ago of over 4000 carloads of

Form 625-A

MARTIN-PARRY CORPORATION
COMMERCIAL AUTO BODIES AND PARTS

CAR LOADING LIST

DATE	NAME
M-P ORDER No.	ADDRESS
CUSTOMERS ORDER No.	DESTINATION
SALESMAN	HOW TO CRATE
TERRITORY —	SHIPPING DATE
TERMS	ROUTING

DATE SHIPPED		Quantity Shipped	Quantity on Order	Unit Etc. Number	DESCRIPTION

Fig. 5. Car loading list or shipping order sent to the factory as authority for packing and shipping to the branch necessary items to replace those reported sold

nested body units—containing windshields, curtains, cushions, and similar fragile items—shipped without a single item being damaged enough to warrant bringing a claim against the railroad.

Physical inventories are made monthly by each branch and the results compared with the inventory record kept at the main office. These checks are made in terms of units and also in valuation. This prevents any clerical errors or similar mischances causing a serious discrepancy in the records and, possibly, resulting in depleted stocks.

An interesting point is that this monthly inventory together with the sales report mentioned before are the only records which are kept by the branch. Branch employes are kept to a minimum and their time is taken up with productive work in assembling and mounting bodies, while the clerical work which such agencies usually perform is all handled by the home office where facilities are much better.

All bodies are sold through chassis dealers or are credited to them. This policy has been followed mainly because complete transportation units must usually be sold to a customer. Few persons will buy a truck chassis without thinking of the body to be mounted on it and it is just as difficult to sell a body without considering the chassis upon which it is to be mounted. Because of this an effort has been made to sell the salesmen of chassis dealers so thoroughly on the value of Martin-Parry bodies that they will use these bodies to complete the chassis which it is their prime purpose to sell.

Relations With Car Dealers

The company's representatives do not come into contact with the ultimate purchaser of its bodies and because the dealer salesmen who do make this contact can never regard its products as more than of secondary interest to them it has been necessary to take definite steps toward cementing the relationship between the branches and the various car dealers.

One important factor in this plan was suggested before when it was stated that all body sales are made through dealers or credited to them. Occasionally a truck operator will conceive the idea that he can get a better price by going directly to the branch than by buying a body through the dealer from whom he buys the chassis. The branch will sell him a body but, at the same time, it learns by direct question or by tracing the number of the chassis the name of the dealer from whom the chassis was purchased and credits him with the regular commission on the sale.

Constant adherence to this policy has done much toward making truck dealers friendly with the company and interested in pushing its products. Nearly all of its sales and advertising effort is directed at dealer's salesmen with full permission and cooperation of the dealer. In some instances the company has offered prizes to dealer salesmen and has staged sales contests in which the dealer has sometimes joined with additional trophies.

European and U. S. Practice

THE differences between European and American practice in respect to piston displacement and number of cylinders of passenger cars are illustrated in an interesting manner in the accompanying graph, reproduced from a report on the Amsterdam show in *Auto-Technik*. The horizontal scale represents piston displacement in liters (one liter—61 cu. in.) The first vertical bar evidently represents all cars with a cylinder displacement up to 61 cu. in.; the second all cars with a displacement of over 61 and up to 122 cu. in., and so on.

The number of cars with engines of any particular range of displacements is then divided into sub-classes in accordance with the number of cylinders. The chart confirms what is already well known, namely that the displacements of American cars range much higher on the average, but it also shows that while most European cars have a comparatively small displacement, some cars built abroad have engines of very large displacement, up to 9 liters or 550 cu. in.

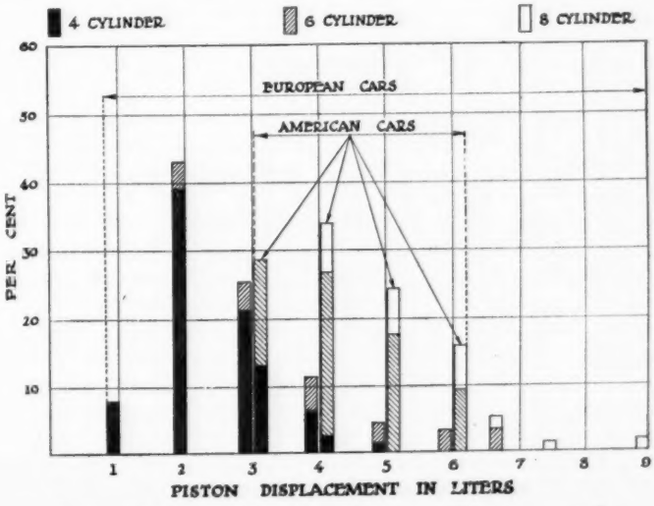


Chart showing differences between European and American practice as regards passenger car engines

French Fear Flood of U. S. Cars if Franc Improves

Manufacturers and press agitated over growing popularity of American automobiles. 1925 sales higher despite heavy duty and unfavorable exchange rates.

By W. F. Bradley

¶ For some time past articles more or less derogatory to motor vehicles of American make have been appearing in certain sections of the French press.

¶ Automobile men in this country subscribing to French periodicals and occasionally coming across one of these articles have wondered whether what they read was simply a stray shot fired casually or part of a volley which was being sprinkled over the French public as part of a broad, preconceived propaganda.

¶ There is no evidence that the latter is the case, but Mr. Bradley tells us that there is a persistent cry against "The American Peril" and he also explains very clearly why it has been raised.

¶ You will find in this story the reason for the attitude of the French industry and press toward the American Automobile in France at the present time.

"THE American Peril" is a cry which is being heard persistently in France at the present time. While French automobile manufacturers had to meet American competition only on neutral markets, even those as close as Belgium and England, the situation was considered satisfactory, but now that American makers are seeking to secure a slice of the French home trade, distress is being displayed.

According to French Government statistics 14,847 American passenger cars and 12 trucks and tractors were imported into France during 1925, compared with 12,832 cars in 1924 and 7315 in 1923. These returns are obviously incorrect, for Ford registrations alone totalled 17,537 for the whole of France during the year 1925.

Ford cars are imported in parts and completely assembled at a factory in the suburbs of Paris. According to state officials, a check is kept on the number of Ford cars thus imported but in what way this is done cannot be ascertained.

21 U. S. Makes on Market

The total number of American makes represented on the French market is 21, as follows: Auburn, Buick, Cleveland, Chandler, Chevrolet, Chrysler, Dodge, Essex, Ford, Graham, Hupp, Hudson, Moon, Marmon, Oakland, Packard, Paige-Detroit, Pierce-Arrow, Studebaker, Stutz and Willys-Overland. American tire firms selling in France are Goodyear and Firestone, while Goodrich has manufactured in France for a number of years.

Of the 21 American automobile makers represented in France the greatest volume of business undoubtedly is being done by Ford, with Buick second, followed probably by Chrysler and Essex. Some of the above are making very few sales, Paris merely being the headquarters from which sales are directed in various Continental countries.

During the past year American automobile registration in France represented 21 per cent of the total, the greater portion of these being Fords assembled in France.

While there is a tendency, in some quarters, to hold the individual American responsible for the high value of the dollar, or the low value of the franc, according to the viewpoint, the fact is recognized in more enlightened quarters that present exchange rates constitute a most effective protection for the French automobile industry. Nominally import duties stand at 45 per cent, but all importers of American cars estimate that they have to add 64 per cent to the price of the car as invoiced to them in America, in order to put it on the French market.

With the franc standing at 28 to the dollar, an active sales campaign is exceedingly difficult. Undoubtedly many American automobile representations are merely being held with the hope that the franc will improve sufficiently to allow business to be done. In other cases American cars, trucks and motorcycles left in France after the war are receiving service with parts manufactured in France, this being done sometimes with the knowledge of the home concerns, in other cases independently of them. Long before the franc had dropped to its present level the local representatives of American firms realized that they could manufacture parts cheaper in France than they could import them.

If the franc recovered American automobiles would

flood the French market, is the opinion very generally expressed, and it is this fear, rather than a very immediate danger, which has brought forth the cry of "The American Peril."

Influence is being brought on newspaper writers to emphasize the danger lying ahead of the French industry. Charles Faroux, who occupies a leading position among French automobile journalists, represents a moderate view in stating that whenever he has been asked to test and write a description of an American automobile, he has nearly always handed it back with the remark "I do not consider your car suitable for the French public." Faroux endeavors to explain that natural and economic conditions in the United States—crowded and level roads, low speed limits, cheap gasoline—tend towards the production of a type of car which is quite unsuited for conditions existing in France.

Having proved that American cars cannot give satisfaction in the hands of the French public, Faroux makes exceptions of Buick, Chrysler, Willys-Knight, Cadillac and most of the General Motors products, Packard, Locomobile, Pierce-Arrow, Lincoln, and finally states that "at its price the Ford is really worthy of attention."

The French automobile manufacturers association has discussed the question of American competition, but without deciding on any action as far as can be determined.

One maker has issued a circular letter to his supply firms stating that he will not receive them if they come to his office in American cars. Others made the same announcement in a more discreet manner. In some cases pressure is brought on dealers to prevent them handling American makes, but this is dangerous ground, for it is generally recognized that American marketing methods are superior and too great pressure on dealers may drive them into the hands of foreign firms.

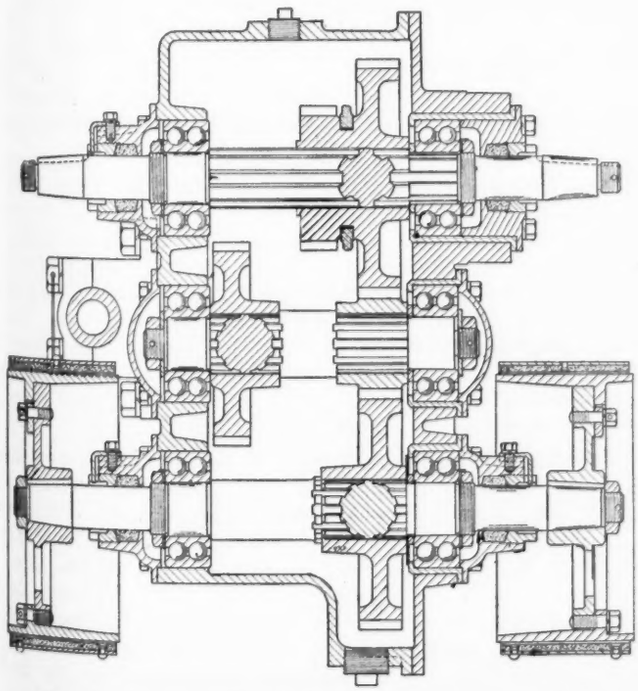
Additional tariff protection is not looked for. The present 45 per cent duty, to which a more recent 12 per cent duty has to be added, constitutes a wall of practically maximum height. Realizing this, the more energetic manufacturers are endeavoring to embody into their cars the better features of American machines and in several French factories American automobiles are being compared, point for point, with the home product.

The features on which advantage is given to American makes are silence, particularly when idling and at moderate engine speeds, flexibility, body equipment and painting. With a few rare exceptions, French firms are not equipped for quantity body production, as Gabriel Voisin has pointed out in a book which has raised the ire of French body builders.

Drop Gear Used on Coleman 2½ Ton Truck

A 2½-TON model truck has been added by the Coleman Motors Corp., of Littleton, Col., whose 5-ton truck was described in *Automotive Industries* of Dec. 10, 1925. This new model also is of the four-wheel drive type and was designed by Arthur W. Herrington, of Washington, D. C.

The engine is a Buda four-cylinder of 4-in. bore and 5¼ in. stroke, with a counter-weighted crankshaft and a No. 2 S. A. E. bell housing. The radiator is of Rome-Turney make and of the same size as used on the 5-ton Coleman. A multiple disk clutch and a four-speed Covert transmission are used, the latter having a 5:2 low gear ratio and a 7:3 reverse ratio.



Drop gear of the 2½ ton Coleman four-wheel drive truck

In addition to the regular transmission, use is made of a so-called drop gear which was specially designed for this truck. On high gear the ratio is 1:1 while on low gear it is 3.292:1. Spicer propeller shafts are used between the transmission and drop gear and from the drop gear to the front and rear axles, respectively, all of these shafts being of 2¼ in. dia.

A pressed-steel, channel-section frame is used, with no offsets and with a 6 in. by 3 in. by ¼ in. section. The two main frame bars are tied together by four cross-members of 5½ in. by 3 in. by ¼ in. section. The frame spring brackets and the brackets on which the engine and transmission are supported are of cast steel.

The rear axle is of the Wisconsin Parts Company's make, of the double reduction, full floating type, with a reduction ratio of 8.57:1. There are double brake drums on the rear wheels. The front axle, which, of course, is also a driving axle, is similar to the rear one, and the drive shafts of the front and rear axles are interchangeable. These drive shafts measure 2 in. over the splines. The front wheel assembly is of the Coleman type, as illustrated in our issue of Dec. 10, last.

Pneumatic tires 38 by 7 in. are used all around. Front and rear springs are interchangeable, both being 48 in. long by 3 in. wide, with eleven leaves.

Owing to the combination of the regular four-speed transmission with a two-speed drop gear, eight forward and two reverse speeds are available. The total or overall gear ratios for forward drive range from 8.57:1 to 182.8:1. This high gear reduction on low enables the truck to take grades of almost any degree of steepness, and to be able to hold it on such grades it had to be provided also with very powerful brakes.

There is a double brake on the transmission drive-shaft, which is foot-operated. This brake has a length of lining of 26¼ in. and a width of 4½ in., making the total brake surface 236.25 sq. in. In addition there are double, hand-operated brakes on the rear wheels.

Quality of Machine Forgings Much Improved by New Methods

Better understanding of die design and progress in forging machine construction have advanced art to higher state of perfection. Production rate is increased and costs reduced.

By Charles D. Harmon*
Engineer, The National Machinery Co.

THAT the quality of machine forgings has been improved to a marked degree is a fact not generally appreciated in all quarters. In fairness to the machine forging industry—that the makers of upset machine forgings be accorded due recognition for the quality of their product—we feel it entirely in order to call attention to some of the features which have advanced the art to its present position. Naturally, such improvements in the quality of machine forgings bring the method into keener competition with the next other method of producing quality work, which is drop forging. Consequently, in this discussion it is necessary to make a comparison of the relative merit of machine forging and drop forging operations.

The reputation of the upsetter or forging machine is handicapped considerably by its ancestors. In the past, defective upset forgings were produced through defects in design and construction of the forging machine, lack of knowledge of proper die design on the part of the user, or both.

A better understanding of die design and methods, and a marked improvement in the quality of forging machines have materially changed the picture. It is with the object of producing a clearer realization of the increased effectiveness of the forging machine that the following thoughts are submitted.

Until a few years ago the upsetter was known as a "stoving up" machine. Early machines made but little effort to grip the average job sufficiently to prevent slipping and as a result the back stop was depended upon largely to hold the material in place. Excessive spring in the bed frame, lack of proper backing for the gripping die, and poor alignment of the heading tools resulted in swollen shanks, excessive fins and distorted upsets, all of which worked considerable hardship to the reputation of the forging machine as a means of producing forgings of quality.

For years the drop hammer has been a highly developed tool. The forging machine, on the other hand, was a crude tool which has been greatly developed and perfected. Today it is possible to produce machine forgings so well that it is a question whether the forging machine or the drop hammer is the more efficient tool for the job.

I wish it understood that this comment on forging machines applies to all makes of machines, and is intended to serve the forging machine industry as a whole, and is not intended in any wise as applying to any special make.

MACHINE upsetting is a gathering up operation; drop hammering is essentially a flattening or spreading operation. Many jobs class themselves immediately as drop hammer jobs or machine forging jobs.

This discussion, however, refers to those jobs which are in the twilight zone between the two methods. It is a digest of a paper read recently before the Production Standards Division of the American Plan Association of Cleveland.

It is written by a representative of an important forging machine company and presents the machine forging side of the case.

At first glance the forging machine and the drop hammer do not seem to compete. Machine upsetting is a gathering up operation, whereas drop hammering is essentially a flattening or spreading-out operation. Many jobs class themselves immediately as drop hammer jobs or forging machine jobs. This discussion does not refer to work of this class. There is a large amount of work in the twilight zone between the two methods and it is for such work that the progress in machine forging methods should receive consideration.

Let us take up the consideration of a forging from the viewpoints of strength, finish and cost. On the subject of strength we feel that some misinformation in regard to the quality of upset machine forgings exists—probably accounted for by some of the failures in the early days. We grant that with improper die design, folds or buckles will reduce the strength of the forging. However, the few rules in regard to the correct design of forging machine dies are so simple, and the proper practice is so well understood and so generally followed, that there are but few failures from this cause.

Granting that sufficient operations have been used in making the upset forging so that folds or buckles are not caused, then comes the question whether or not there is a sufficient amount of increased "working" of the metal in the drop hammer, as compared with the forging machine, to increase the quality of the forging. In some quarters the belief still exists that the repeated blows in the hammer greatly refine the metal and improve its quality. Conversely, it is thought that the upsetting method opens up the fibres of the stock, develops cracks and seams, and more or less injures the strength

* A paper read before the Production Standards Division of the American Plan Association, Cleveland, O., March, 1926.

and quality of the forging. It is true that the drop hammer or forging machine will improve the quality of a forging just to the extent that work or pressure is exerted upon it.

Most of this work in the drop hammer is exerted upon the flash, and the "working" of the metal in the forging itself is much less than one would assume on first thought. The forging is protected by the impression, and generally gets by with a minimum of punishment.

Enormous Pressures Applied

On the other hand, a forging machine makes many types of forgings in confined dies where enormous pressures are thrown upon the metal, with a corresponding refining tendency. When we call attention to the fact that the available pressure in a 5 in. forging machine on the last ¼ in. of stroke is 2400 tons, you get some idea of its working and refining tendency.

Stock in a drop hammer die can spread outside of the impression so easily that the drop hammer does not possess the advantage of holding the metal in a confined condition, as is possible in the forging machine. Frequently it becomes necessary in drop hammer work to trim off the fin and restrike in order to develop the necessary amount of pressure on the stock to cause it to fill the die impression. On the other hand, the fact that work is gripped in a forging machine allows many upsets to be confined in heading tools or in impressions in the gripping dies, with the result that much higher pressures are developed on the average job in a forging machine than on a hammer.

We show in Fig. 1 a job in forging machine dies, which makes quite clear that, there being no relief for the stock, the heading pressure can exert an excessive working or refining tendency. Such excess working in the forging machine certainly tends to improve the quality of the forging, and should be considered as a "credit" to machine forging.

There are jobs done largely in the open where seams or other surface defects in the bar show up but these seams in the case of drop forgings would still be present in the forging. Seldom do such seams work entirely into the flash. Although they appear to be hidden by the hammering, they are quite sure to show up in subsequent heat treating operations. It must be admitted that seamy bars will show up in a forging machine more quickly than in a drop hammer. This action tends to work against the reputation of the forging machine. This, however, is an unfair charge. As a matter of fact, the forging machine should be given credit for being a good inspector where the steel maker has been negligent in chipping seams or cracks from the billets.

The idea that upsetting tends to open up the fibers of the steel is possibly attributable to seamy bars. Upsetting action is able only to swell the diameter of the bar by (a) increasing the cross section of the fibers or grains; (b) arranging them more closely together, or, in other words, increasing their mass; or (c) by merely rearranging the position of the grains as a result of the pressure applied. In any case, the result is one of putting the grains under compression, which is a refining tendency.

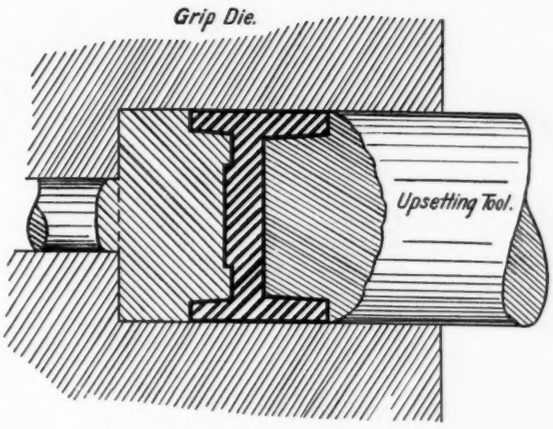


Fig. 1. Piece produced in forging machine with no flash and very little draft. Metal in forging is refined and allowance is small

As an indication that the fibers of the steel are not spread apart in upsetting, attention is called to Fig. 2 which represents a bar of steel 1 in. in diameter, not confined in a die impression, but extending in the open 3 in. beyond the face of the gripping dies, and which has been upset for a short distance. There is a quite uniform increase in diameter throughout the entire length of the upset portion, indicating that the grains of the steel throughout the entire length were under compression and were swelled uniformly. Had the upsetting tended to open up the grains or fibers one would expect such a forging made in the open to spread out into more spherical shape. Fig. 3 shows the same dimensioned blank upset a further amount. The upset portion is still quite uniform in diameter and has not assumed a ball shape.

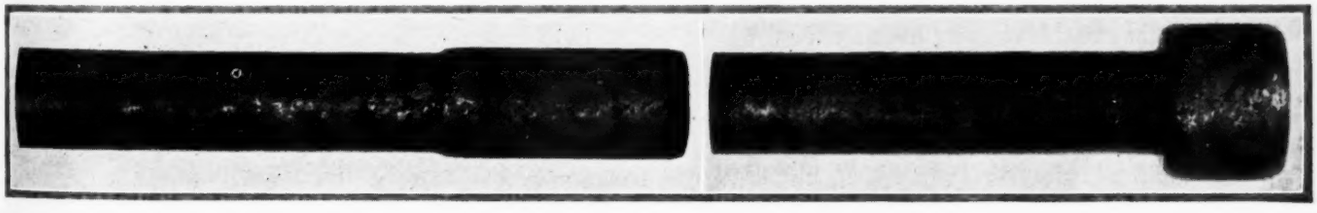


Fig. 2. Upsetting effect on bar which was unsupported for distance of 3 in. End of bar must be trimmed square to produce this uniform effect. AT LEFT: *Fig. 3. Same bar upsetted further, showing absence of spherical effect*

The increase in diameter of a forging is accomplished by this upsetting action of all of the grains or fibers, and not by a separting or opening-up action of them. This can be accomplished only by putting the grains in the center as well as in the outer portion of the forging in compression.

Shape Obtained by Compression

We can liken upsetting to the action on an imaginary bar of steel balls in which the balls are merely rearranged. The desired shape is obtained by bringing them into the compression necessary to force them into the shape of the forging. Figs. 4 and 5 show that the balls are caused to flow into the impression not by spreading them apart, but by putting them in compression one with the other. These two sketches are drawn to the same scale as Figs. 2 and 3. Fig. 6 shows what

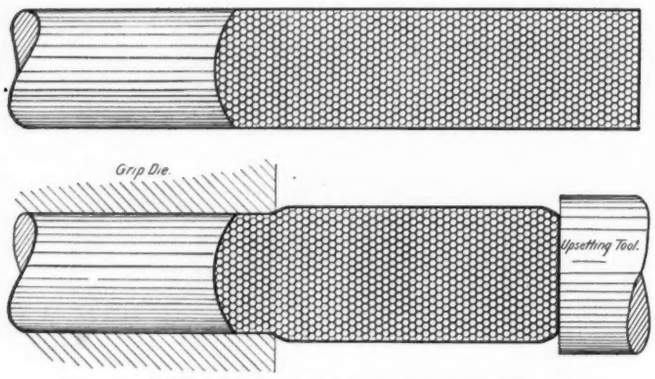


Fig. 4. Theoretical bar of some proportions composed of steel balls showing how upsetting is accomplished by compression and rearrangement

would happen if the operation were continued to form a flange.

Fig. 7 is an etching of an upset of a round ball on an iron bar. This shape combined with the fact that iron is fibrous would be expected to show upsetting to worst advantage, particularly as the stock is not confined in the impression until the very end of the stroke. It is clear, however, from the photograph, that there is a thickening of all of the fibers of iron and slag. The center portion shows a greatly increased thickness. It can be seen clearly that the fibers near the very outer edge of the upset are also thicker than in the original bar.

Outer Portion Not in Tension

Because seams or cracks sometimes develop around the outer edge of a forging, there is a belief in some quarters that the outer portion of an upset is in tension. This is not the case as the entire upset is in compression, although it is true that this compression will open up any seams that exist in the original bar.

This photograph shows clearly that the compression tendency does extend to the very outer edge of the upset and confirms our statement that the entire upset is in compression.

Another consideration which serves to improve the relative quality of machine forgings is that they are invariably made from rolled bars which have the advantage of the working in rolling. Drop forgings are generally made from forging billets which have not had a corresponding amount of working or refining.

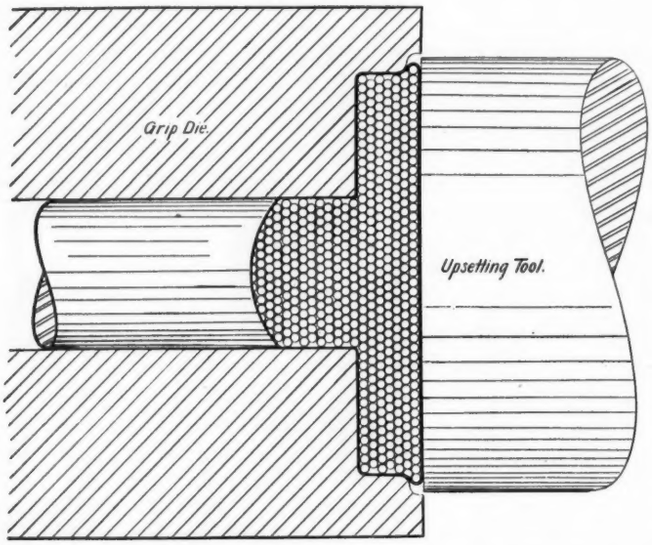


Fig. 6. Theoretical bar upset to flanged end to illustrate effect of further rearrangement and compression

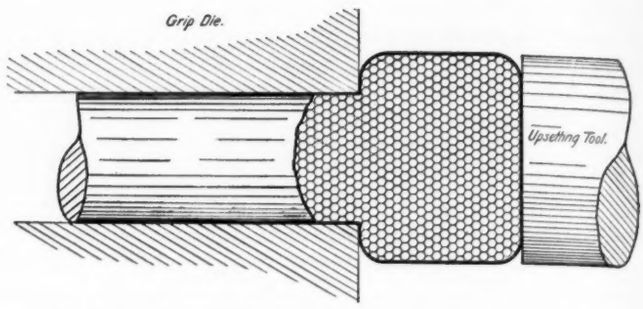


Fig. 5. Theoretical bar upset to dimensions shown in Fig. 4

The fact must be kept in mind, also, that it is almost invariable practice to upset stock in the forging machine by pressure upon the end. Consequently, the stock is forced out uniformly in all directions with the result that there is a very uniform strength around the periphery of the forging.

Experiments by Massey show that a gear blank made from stock having the grain running lengthwise gives strength in the teeth at the different positions as indicated by the numerals in Fig. 8. If the gear is made from a blank in which the grain runs endwise, the strength of the teeth is practically uniform as indicated in Fig. 9. A greatly increased strength also is secured because the teeth are cut against the radial flow of the grain.

Taking a broad view of the average job made on the forging machine, we feel safe in stating that this endwise upsetting gives a marked advantage as compared with the crosswise grain flow in many drop forgings. We are unable to see and cannot grant any advantage in strength or quality of the average drop forging as compared with the average machine upset forging.

Considering the subject of finish, the added number of blows and the customary slushing of drop hammer dies to give drop hammer work a superior finish over that of average upset work. Here again upset work is charged with so many defects inherent in old style forging machines that the progress made by present type forging machine equipment in improving the finish of the work is not fully appreciated. In fairness to the forging machine manufacturer, increased stiffness in bed frames, increase in crankshaft sizes and quicker starting should be noted. More powerful gripping pressures are provided and improvement in grip die and heading slide alignment now make it possible to secure a quality of machine forging which in many cases compares equally with the finish obtainable from drop hammers. Present day machines have eliminated die disalignment, greatly reduced part line fins, swollen shanks, etc.; by their ability to gather more unsupported stock in one blow, they are able to produce work in fewer strokes and with less necessity for reheats. All of which makes for a great improvement in the finish of the work produced.

In the early days of the forging machine, suitable steels were not available for punching shearing, etc., so that the prompt deterioration of such tools materially affected the finish of the forgings. However, steels are available now which greatly improve the wearing qualities of the dies and thereby enhance the finish of the work.

On the last consideration, cost, there are many items entering into the picture which determine the question

of the adoption of the drop hammer or the forging machine for the job. Improvement in the quality of machine forgings throws a greater proportion of possible jobs into the class where the relative merit of the two methods must be considered. For this reason a clear understanding of all of the items entering into the cost is desirable.

A general statement could be to the effect that when work can be made by either method, the forging machine cost is lower. This is because the production from the forging machine is generally twice that secured from the hammer. Less skillful labor is required. There are few cases where fins must be trimmed off and as but little draft is required to get the work out of the dies, the forging will work closer to finished size.

Items Easy to Overlook

The above items of cost are analyzed easily but there are many other items which are more liable to be overlooked. The difference in the amount of stock left on the forging for finishing can greatly affect the machining cost of the piece. In many cases, also, stock can be removed from the end of a forging, holes punched through, or other shapes provided which cannot be duplicated on the drop hammer. This saves the cost of steel and effects a material saving in machining, freight, etc.

While it is customary to make machine forgings from rolled bars which are somewhat more expensive than forging billets, nevertheless, the fact that from 90 to 95 per cent of the bars are turned into finished work on the forging machine cannot be overlooked. In the case of drop forgings, the tong hold and the excessive flash allow only 65 to 70 per cent of the bars to be turned into forgings.

In most cases, the trimming operation is eliminated by the forging machine method.

There is some misunderstanding in regard to the relative cost of drop hammer and forging machine dies.

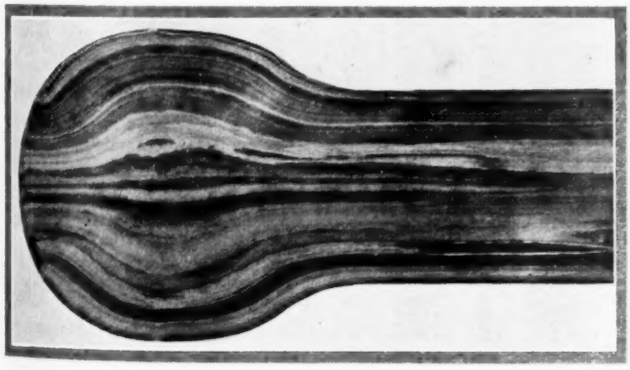


Fig. 7. Etched longitudinal section of ball upset on end of iron bar. Compressive effect is shown by increased width of streaks of iron and slag

Forging machine dies appear to be more expensive because there are more pieces in a set. However, much of the work on upsetting dies is lathe, drill press or boring work, which is much cheaper than die sinking work.

With the present up-to-date forging machine in which a rigid bed frame and a powerful grip are provided, there is much less tendency to wear off the corners of gripping dies than in the old style machines where the dies spread apart more easily. Furthermore, the improvement in slide and heading tool alignment has greatly reduced tool interference, with the result that much longer heading tool life is now obtainable.

Use of chrome and tungsten hot die steels for inserts, punches, etc., has greatly reduced the cost of maintenance of upsetting dies. As the pressure applied is gradual such steels can be used successfully in the forging machine to a greater extent than in the drop hammer.

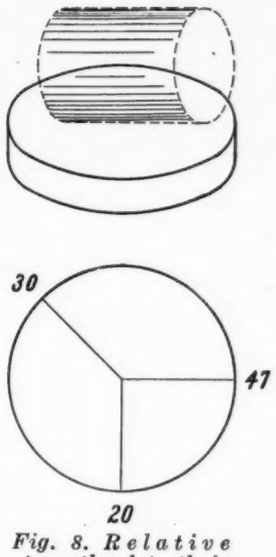


Fig. 8. Relative strength of teeth in gear forged with grain of stock running in one direction through the gear

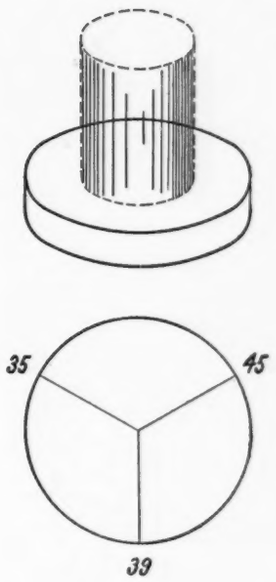


Fig. 9. Relative strength of teeth in gear forged by the upsetting method

Both the first cost as well as the maintenance cost of upsetting dies in present day machines is materially less than that of drop hammer dies.

The writer trusts that this discussion will be accepted as a friendly statement, absolutely without malice toward the manufacturers of drop hammers. It is presented with the hope that some of the misunderstandings and criticisms which have been directed against forging machine practice in the past will be cleared up. We have no thought of attempting to rob the drop hammer of any of its glory, for it is certainly a highly developed tool and will always remain one of the most important agents for production in the forging shop. We are merely pleading for fairness to the forging machine, because originally it was a very crude tool—giving commensurate results; whereas, at present the thought and effort which have been directed by the forging machine manufacturer to the improvement of his machine raises these tools to the point where they are worthy of the most thoughful consideration on the part of the forge shop executive. Just as every drop hammer commands respect, we can, with equal sincerity, say that there are no bad forging machines, and any of the makes can be relied upon for cost reducing results.

But just as the father sometimes overlooks the fact that the boy has grown into a man, some drop hammer users fail to see the changed condition in upsetting equipment; and only in fairness to the forging machine industry have we presumed to submit the foregoing facts.

TWO new sectional committees of the American Engineering Standards Committee have been formed, to prepare proposals for the standardization of plain and lock washers and of machine pins respectively. The work of both of these committees is sponsored jointly by the Society of Automotive Engineers and the American Society of Mechanical Engineers.

U. S. Exports of Cars, Trucks, Tires and Parts

COUNTRIES	GASOLINE PASSENGER CARS										TRUCKS					
	Up to $500		$500 to $800		$800 to $1200		$1200 to $2000		Over $2000		Up to 1 ton		1 to 2½ Tons		Over 2½ Tons	
	No	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Austria																
Azores and Madeira Islands	5	$2,054			1	$983					3	$1,212	1	$1,495		
Belgium	144	66,622	48	$37,139	121	158,682	64	$103,538	11	$34,448	288	117,948				
Bulgaria																
Czecho Slovakia			7	5,085	6	6,309	9	13,267	1	2,500						
Denmark	1,824	733,022	104	84,656	137	138,602	8	11,008	10	30,374	434	179,193	2	2,311		
Esthonia																
Finland	47	24,233	52	34,414	27	28,227	2	2,912	1	2,500			5	7,275		
France			46	39,291	116	128,255	31	47,614	21	57,039						
Germany			9	7,219	27	25,990	3	4,317	14	36,928						
Gibraltar			1	715			2	3,117								
Greece																
Hungary	2	1,076	5	3,341	6	6,339										
Iceland and Faroe Islands	5	2,401	1	744									1	598		
Italy	780	232,477	18	12,735	11	11,723			5	16,475	223	57,766	5	6,065		
Latvia			5	3,915	8	8 431										
Lithuania																
Malta, Gozo and Cyprus Is.	4	1,850	2	1,516	1	970										
Netherlands			61	45,625	80	79,816	16	24,340	16	57,803			21	23,487		
Norway	2	684	18	12,483	14	13,305	3	5,040	1	2,928	3	3,765	19	31,715		
Poland and Danzig																
Portugal	22	10,119	3	2,432	19	20,408	5	8,617	1	2,500	14	7,287				
Rumania			15	11,546	27	28,402	13	21,463	2	5,458						
Russia											152	11,331				
Spain	89	29,514	117	88,580	215	227,709	82	124,149	13	38,315	237	91,958	15	14,589		
Sweden	32	14,830	160	116,446	127	127,531	16	25,476	27	72,742			13	13,150		
Switzerland			15	10,473	13	15,326	23	34,218	10	25,000	4	1,636	1	1,227		
Turkey			3	1,779	3	2,824	3	3,903					6	6,452		
United Kingdom			434	260,363	109	109,879	56	82,011	25	64,828	52	29,568	222	248,683		
Irish Free State											2	1,146				
Yugoslavia			11	8,197	2	2,044			1	2,729			1	1,700		
United States																
British Honduras	1	350														
Canada	136	50,500	483	279,699	298	286,832	83	120,334	33	99,797	92	97,110	67	71,274	17	58,793
Costa Rica			7	4,912	5	4,909	3	4,973			1	821	4	5,433		
Guatemala	5	1,856	7	5,291	21	21,654	8	11,549			16	7,609	10	20,397		
Honduras	3	1,167	3	2,111							5	1,959				
Nicaragua	2	955	2	1,328	2	2,009	3	4,099								
Panama	26	9,652	5	3,332	14	14,261	4	5,464	3	6,400	11	7,319	5	8,122		
Salvador			1	650	10	10,463	2	2,938	4	10,000	2	2,406	1	1,510	1	4,180
Mexico	475	170,294	257	178,779	171	172,336	50	74,635	22	66,396	141	86,199	66	89,850	31	134,753
Newfoundland	1	496	3	2,181	2	1,904										
Barbados	1	537	2	1,517	4	4,520	1	1,545								
Jamaica	33	13,176	32	20,400	9	9,055	6	8,616			6	2,676	1	2,431		
Trinidad and Tobago	8	3,812	4	2,643	4	3,935					4	3,270				
Other British West Indies	14	4,604	3	2,116	6	6,620					9	2,870	1	1,400		
Cuba	334	134,938	137	93,838	37	35,015	9	13,739	19	55,902	209	79,347	15	19,882	13	90,563
Dominican Republic	27	11,452	3	2,131	6	6,453	2	3,400			21	11,393			2	9,228
Dutch West Indies	1	360	2	1,461	5	4,878	1	1,380			13	4,652				
French West Indies																
Haiti	16	5,938	13	8,672	9	8,865	4	5,596	1	2,500	22	15,636	10	12,631		
Virgin Islands	1	496														
Argentina	1,515	594,858	660	440,498	545	580,575	138	198,005	45	112,267	252	107,141	39	115,864	15	49,431
Bolivia					1	1,070					2	1,690	5	7,509	1	4,405
Brazil	2,305	766,545	324	232,590	182	190,064	39	55,726	44	114,252	349	147,455	2	2,133	6	61,200
Chile			18	12,711	28	27,624	19	29,897	3	7,950	178	57,838	37	56,645	13	38,615
Colombia	47	20,294	19	13,516	31	34,746	18	27,245	9	25,469	1	1,051	45	56,109		
Ecuador	9	3,448			3	2,873	5	7,148					1	2,500		
Falkland Is.											28	12,088				
British Guiana			1	629												
French Guiana																
Dutch Guiana																
Paraguay	1	486			1	1,014					18	6,440				
Peru	60	25,227	7	4,788	31	35,056	4	6,186	5	15,044	80	48,698	106	114,013		
Uruguay	678	194,938	63	45,168	60	61,192	24	34,579	3	8,970	5	5,093	6	7,133	3	7,914
Venezuela	56	21,832	20	14,461	75	74,485	12	17,217	6	16,833	96	44,983	26	33,567	1	1,729
Aden	1	375	7	3,829												
British India	22	10,181	50	37,655	98	102,684	13	18,576			30	25,601	10	12,392		
Ceylon	10	4,660	25	18,817	7	7,189	1	1,334	1	2,789	23	20,821	13	23,410	7	9,098
Straits Settlements	42	17,310	59	50,281	48	52,636	5	7,310	3	7,500			5	8,885	3	7,995
China	41	14,656	17	13,264	56	57,812	8	11,866	2	5,000	32	18,438	1	1,057	1	1,885
Java and Madura	5	2,205	68	45,829	42	41,937	9	13,576	2	5,000	2	1,711	4	4,064		
Other Dutch East Indies	1	441			10	9,301	2	2,771	2	5,000	4	4,434	10	9,959		
French Indo China	5	1,880									6	2,112				
Hejaz, Arabia and Iraq	100	36,120			2	2,217										
Hongkong	21	6,892	2	1,310	3	2,838					5	1,760				
Japan	26	7,851	22	16,477	54	57,305	4	5,994	4	9,978					1	8,657
Kwangtung			3	2,110	1	1,168					5	4,953				
Palestine and Syria	40	14,400	20	14,906	38	36,626	2	2,729					1	1,492		
Persia	9	3,321			3	2,764					3	2,403				
Philippine Islands	142	57,502	20	14,489	45	49,012	16	23,321	4	10,000	54	20,422	20	20,702	7	17,063
Russia																
Siam	4	1,880	7	4,772												
Other Asia																
Australia	1,317	450,300	1,133	780,928	683	748,095	73	103,590	65	165,036	1,181	569,887	135	175,623	37	110,237
New Zealand	239	116,224	145	100,494	353	406,194	32	47,641	11	28,618	36	23,149	18	28,593	4	12,124
British Oceania	5	2,632	2	1,599	7	6,670	1	1,548			2	1,041	2	1,999		
French Oceania	1	476	1	700	1	895										
Other Oceania																
Belgian Congo											10	3,520				
British West Africa	5	1,309	9	6,804	1	995	2	2,750			42	24,441	68	78,072		
British South Africa	180	76,228	167	127,535	772	857,453	26	38,129			59	29,554	16	23,750		
British East Africa	5	2,480	25	18,643	21	23,800	3	4,044			45	24,201	6	6,473		
Canary Islands			2	1,614	1	964	2	3,050								
Egypt	3	1,234	12	9,270	8	8,129	2	3,085			24	7,040				
Algeria and Tunis																
Other French Africa	13	4,664									65	25,537	2	2,562		
Italian Africa			1	800												
Liberia											4	1,740				
Morocco	44	16,800									12	4,848				
Portuguese East Africa	2	1,032	1	827	21	24,647							4	13,523		
Other Portuguese Africa	23	9,925									23	10,597				
Spanish Africa			2	1,488												
Total	11,017	$4,020,071	5,011	$3,438,557	4,905	$5,245,519	972	$1,440,580	450	$1,233,068	4,640	$2,086,764	1,074	$1,399,796	163	$627,872

for February, 1926 | Canadian Exports

ELECTRIC VEHICLES		PARTS	TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
			Casings		Inners		Solids		Up to $500		$500 to $1000		Over $1000					
No	Value	Value	No	Value	No.	Value	No.	Value	No.	Value	No	Value	No.	Value	No.	Value	Value	
		$240																Austria
		2,584	37	$352	47	$80												Azores and Madeira Islands
		316,537	306	7,790	76	212			10	$3,030	7	$6,396	5	$6,154			10,697	Belgium
		551	33	534	65	157			3	1,261								Bulgaria
		575	370	17,510	264	1,423	58	$3,824										Czecho Slovakia
		1,034,162	13,269	114,539	11,703	21,673	4	154			3	2,566	15	18,460			52,511	Denmark
		618																Esthonia
		11,154	743	15,605	811	2,602					5	3,390					133	Finland
		247,163	2,836	23,008	318	1,796	10	551			32	27,035						France
		45,571	1,271	57,196	948	4,710											11,028	Germany
		40																Gibraltar
		5,025	216	5,030	72	198	2	150										Greece
		660	45	833													27	Hungary
		854											8	9,816			19	Iceland and Faroe Islands
		221,834	54	1,388	97	26											247	Italy
		164																Latvia
		40	200	3,078	130	370												Lithuania
		1,168							10	4,230					6	$2,636		Malta, Gozo and Cyprus Is.
		73,657	1,278	41,233	752	4,475	25	1,133			16	11,310	8	8,108				Netherlands
		6,000	1,725	35,327	1,022	2,250	56	3,054	3	1,033	6	4,068						Norway
		519	5	190			10	181									80	Poland and Danzig
		6,410	57	1,105	80	225							1	2,035				Portugal
		10,022	215	4,783	276	1,257			2	826	10	5,746	5	6,931	6	2,633		Rumania
		2,100																Russia
		145,542	3,901	75,926	3,500	13,210	726	25,110					39	63,457				Spain
		60,681	2,380	51,102	1,997	4,367	2	169			22	15,445	21	23,885			47	Sweden
		2,952	1,548	37,674	1,729	6,999												Switzerland
		4,932	34	381	56	146			10	4,181			1	2,035	6	2,633		Turkey
		391,971	12,000	183,332	1,815	4,939	1,940	66,768			57	54,124	80	113,403	250	46,153	21,235	United Kingdom
		300															5,528	Irish Free State
		262							33	13,832	3	2,373	3	4,403	2	878	69	Yugoslavia, Etc.
		730	14	138	22	60											62,356	United States
		2,672,908	1,370	20,381	1,456	5,378	33	1,033										British Honduras
		4,312	118	2,923	196	764	4	135	4	1,701	11	9,205			8	3,510		Canada
		9,319	527	15,246	525	2,243	8	545										Costa Rica
		1,416	381	4,191	34	161	40	2,829										Guatemala
		1,419	8	128	2	11	10	387										Honduras
		9,837	1,126	26,295	1,998	5,612	6	124										Nicaragua
		4,775	139	4,036	327	1,025	70	6,681									6	Panama
													3	3,664				Salvador
3	$1,465	117,384	7,813	120,570	7,513	18,082	104	2,777			1	888	2	2,414			26	Mexico
		2,244	7	126	5	21											545	Newfoundland
		1,099	50	726	48	154	18	378	15	5,333	2	1,797						Barbados
		15,252	52	1,646	73	270	24	598	17	7,307	7	5,580					274	Jamaica
		2,996	69	1,205	44	140	26	658	6	2,515	6	4,741	1	1,111	4	1,760	7	Trinidad and Tobago
		2,707	312	3,943	249	952	2	100	2	857	3	2,168					113	Other British West Indies
		85,317	9,880	112,174	2,915	10,577	545	19,165			10	8,725	2	4,010			55	Cuba
		12,373	800	8,498	185	479	25	702									13	Dominican Republic
		835	215	3,487	453	1,303			2	780								Dutch West Indies
		3,050	95	1,805	114	402			2	805								French West Indies
		7,877	127	3,589	179	704			8	3,224	1	678						Haiti
		1,015	2	40	30	77	22	1,013										Virgin Islands
		537,970	13,097	291,545	21,746	59,948	413	16,883	200	75,600	49	35,480	14	19,080			126,700	Argentina
		3,244	221	6,223	249	1,205	10	317										Bolivia
		444,147	6,134	76,687	4,202	7,007	408	8,995	35	9,294	42	36,078	20	24,472			100,650	Brazil
		149,951	2,083	48,189	3,008	9,077	88	3,572	6	2,601	3	2,278	1	1,276	10	4,388		Chile
		47,365	1,379	41,814	1,787	6,994	93	5,704	2	819	9	8,045	18	22,947			36	Colombia
		4,418	173	3,111	331	1,302							3	3,858	10	4,388	7	Ecuador
																		Falkland Is.
		1,863					6	119	16	5,058	1	888						British Guiana
			12	219	12	31												French Guiana
		217	16	204	32	67												Dutch Guiana
		2,320							6	2,594	2	1,815	1	1,263				Paraguay
		49,454	948	26,701	1,375	6,645	32	1,785									25	Peru
		25,202	2,250	33,983	762	1,931	120	4,547	40	15,240	22	14,040	10	14,723	10	4,686	14	Uruguay
		41,876	1,508	33,991	1,184	6,385	2	109	56	22,524	4	2,712	7	8,509	22	9,65		Venezuela
		516	102	1,436	75	226			10	2,940					6	1,932	226	Aden
		76,729	1,432	22,581	310	704	109	2,879	627	219,601	41	26,696	4	5,810	457	157,703	49,230	British India
		10,624	450	11,315	227	812	51	2,152	62	24,337	10	7,897			39	12,357	6,363	Ceylon
		43,275	1,933	24,996	81	262	315	10,903	575	206,316	24	18,783	1	1,563	240	82,649	25,639	Straits Settlements
		45,766	902	13,772	838	2,149	30	818	42	17,795	7	3,995	7	12,034	12	5,235		China
		17,091	2,024	37,221	1,261	3,619	224	9,895	711	243,142	55	37,847	10	13,087	189	71,316	17,810	Java and Madura
		5,730	555	6,440	380	702	35	1,919										Other Dutch East Indies
							12	462										French Indo China
		6,388	584	6,862	348	1,150			12	4,881	3	2,420	9	12,217	9	3,276		Hejaz, Arabia and Iraq
		4,363	144	2,649	136	449	10	280	3	1,292								Hongkong
		230,491	13,096	165,934	8,348	20,706	1,667	37,545	84	33,543	2	1,468	7	9,459	20	8,725	372	Japan
		802																Kwangtung
		10,058	289	6,929	339	1,622					2	1,860						Palestine and Syria
		3,123							2	805								Persia
		25,101	5,190	80,372	2,688	10,967	255	9,284										Philippine Islands
																		Russia
		2,845	210	2,741	154	406			1	306	1	578			72	22,184	3,345	Siam
		86																Other Asia
		255,116	3,201	88,538	2,005	6,390	648	35,705			74	42,526	2	2,294	760	272,003	34,655	Australia
		113,561	2,060	47,296	633	3,217	468	19,461	1,437	527,293	327	251,676	113	133,948	183	64,194	71,263	New Zealand
1	1,200	2,817	54	1,361	208	599	145	2,797									250	British Oceania
		1,563	73	1,363	103	224	34	1,546										French Oceania
									12	3,768							2,683	Other Oceania
		195																Belgian Congo
		11,912	51	890					33	11,704					32	7,857	11,269	British West Africa
		158,867	1,228	15,428	744	2,464	8	452	459	162,401	16	9,823	1	2,035	57	19,667	15,222	British South Africa
		14,394	519	12,638	279	1,110			42	15,552	9	7,508			43	17,696	2,966	British East Africa
		4,156	95	2,252	34	96									11	4,156		Canary Islands
		10,478	113	2,448	150	540	57	2,584	1	409	2	1,020						Egypt
		60																Algeria and Tunis
		8,173																Other French Africa
																		Italian Africa
		352	22	297	30	65												Liberia
		1,997	88	7,183	88	821			6	2,426					8	3,740		Morocco
		1,018	15	352														Portuguese East Africa
		5,778	76	1,290	150	298												Other Portuguese Africa
		9,582	36	466	35	79												Spanish Africa
4	$2,665	$7,942,187	133,993	$2,136,783	96,848	$280,015	9,010	$318,972	4,607	$1,663,156	907	$681,698	422	$558,469	2,472	$838,099	$633,741	Total

Peugeot Heavy-Oil Engine Now Has Water-Cooled Head

"Hot-bulb" ignition eliminated on latest model of Tartrais two-cycle type automotive engine which is being demonstrated to manufacturers in U. S.

AFTER experimenting for the last six years with an injection type of heavy-oil engine, the Peugeot Automobile Co., of Paris, has reached the production stage and has shipped to the United States a 5-ton truck and two passenger cars equipped with this type of engine.

These vehicles were brought over by the Peugeot mission, headed by Lucien Rosengart, vice-president of the company, and will be demonstrated in such cities as New York, Chicago, Detroit, Cleveland, and Buffalo. Mr. Rosengart and his associates arived in New York, Friday, April 9.

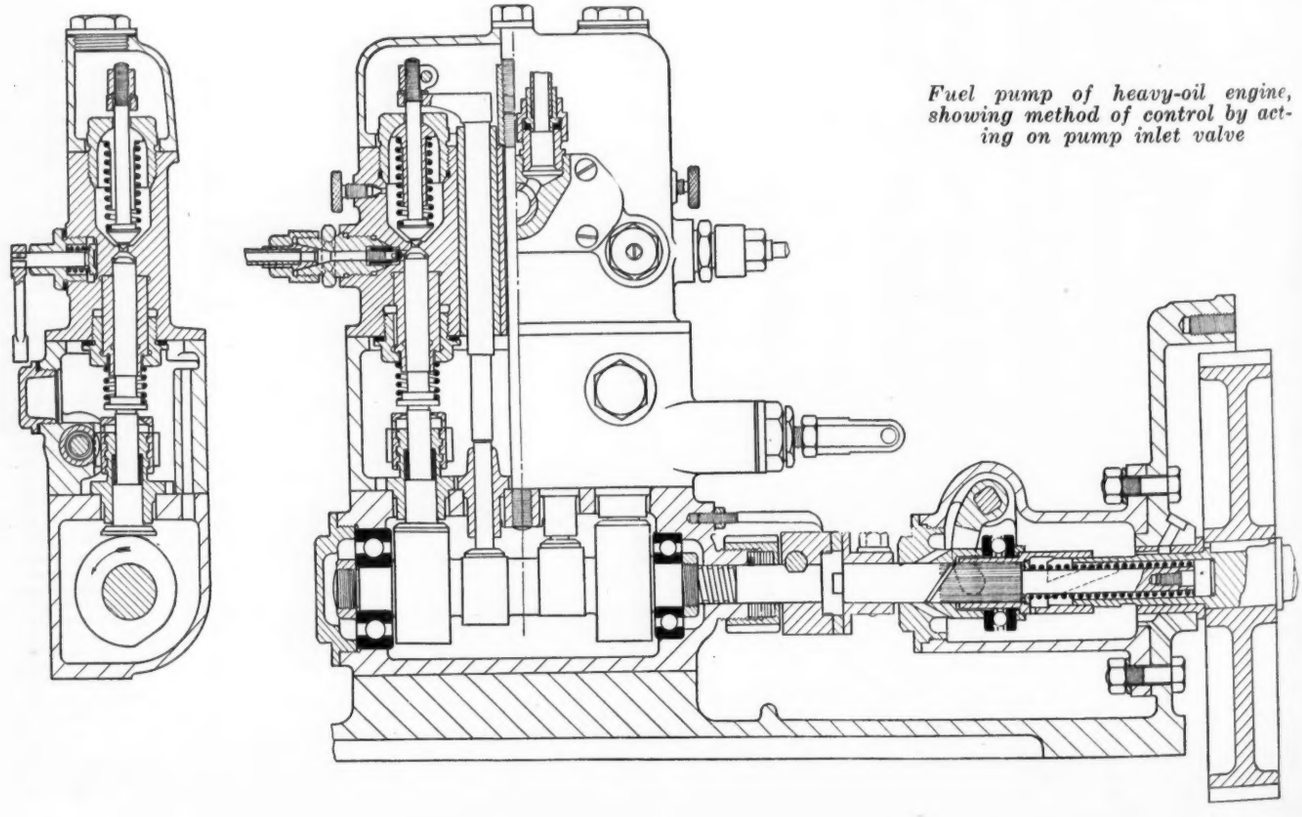
Built Under Tartrais Patents

Built under Tartrais patents, the Peugeot engine is of the two-cycle type with crank throws at 180 deg. Originally equipped with a special type of non-cooled head, it showed remarkably high thermal efficiency, but the cost of production was so high that its practical application appeared doubtful. Recently modified, particularly as regards the head, the piston and lubrication system, the production cost is now no higher than that of a normal engine and the efficiency has not been reduced to any appreciable extent.

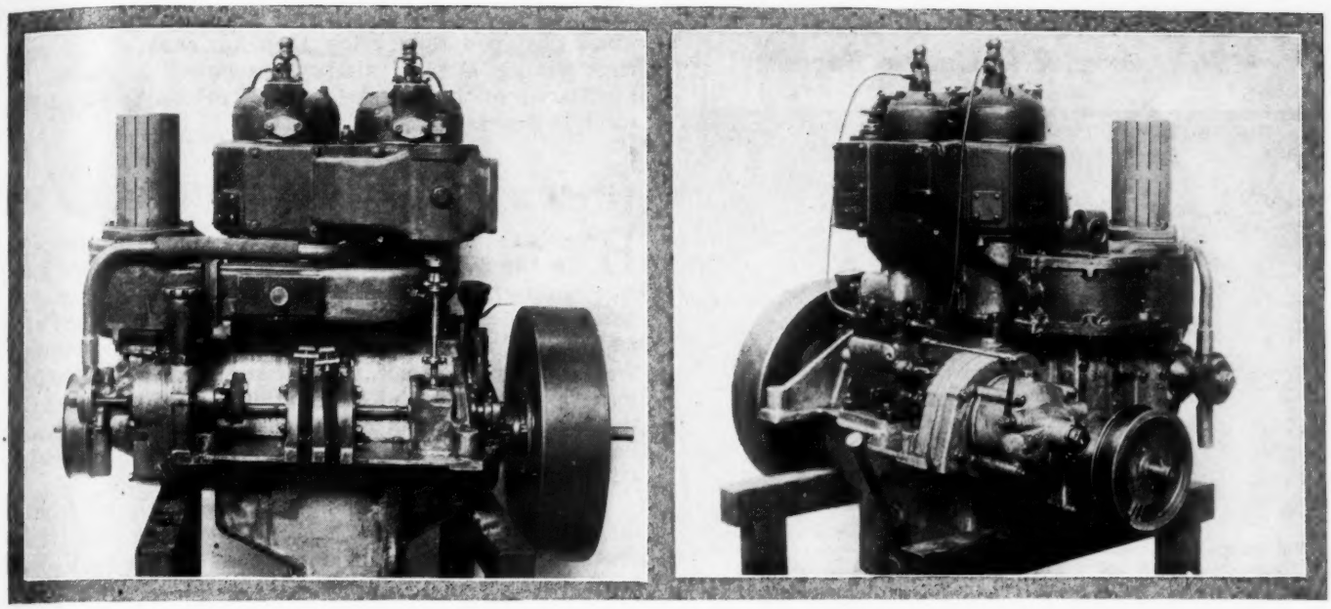
The first of the new series of engine was put through a 50-hour bench test, consisting of two tests of five hours each and of four of 10 hours each, with very satisfactory results. The engine, a twin-cylinder of 120 by 150 mm. (4.7 by 5.9 in.) bore and stroke, maintained an average of 41 hp. at 1300 r.p.m. and 53 hp. at 1450 r.p.m. Consuming gas oil having a specific gravity of 0.87, the fuel consumption averaged 205 grammes (0.451 lb.) per horsepower-hour.

Fitted into a 5-ton truck chassis, a road test of 1056 miles was undertaken at an average speed of 12½ m.p.h. The truck, which was equipped with pneumatic tires, hauled a 2-ton trailer and the journey undertaken was from Paris to Nice and return. The fuel consumption on the road was 11 miles to the gallon, compared with 7¼ miles for the same truck fitted with a gasoline engine. This road test was closed by the accidental breakage of a part of the scavenger pump drive.

In addition to the truck, the Peugeot mission brought to the United States a couple of passenger cars having

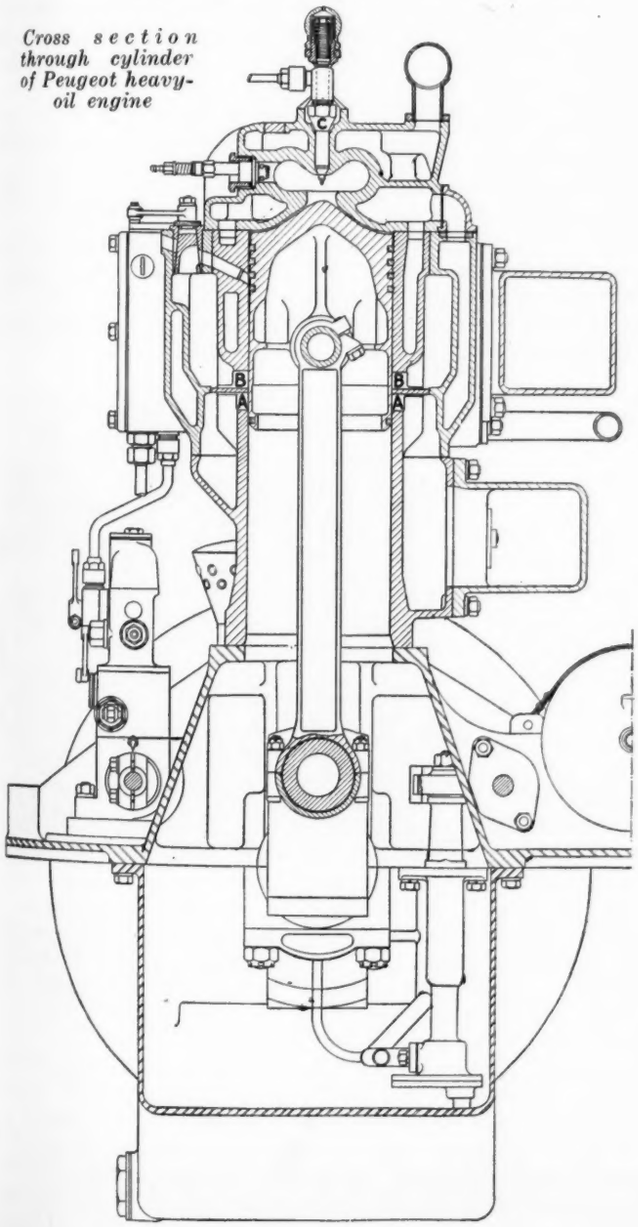


Fuel pump of heavy-oil engine, showing method of control by acting on pump inlet valve



Two side views of the two-cylinder, Peugeot heavy-oil engine working on the two-stroke principle

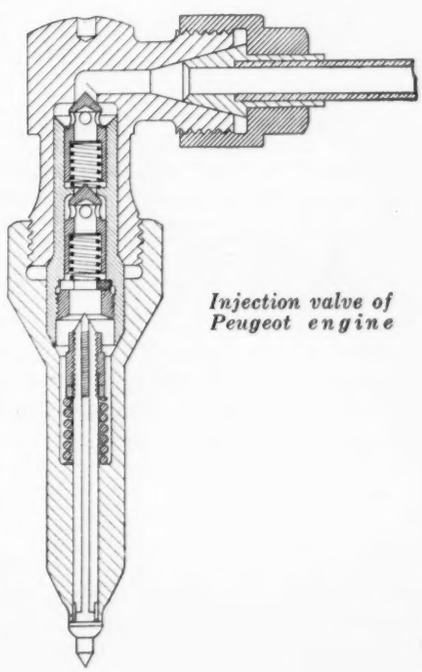
Cross section through cylinder of Peugeot heavy-oil engine



a two-cylinder two-cycle engine of 100 by 140 mm. (3.9 by 5.5 in.) bore and stroke.

The features of the Peugeot engine reside in the special shape of the cylinder head, the fuel injecting pump and the use of an air pump for scavenging and for charging the cylinders. As will be seen from the drawing, there is a bottle neck between the cylinder barrel and the cylinder head, while the aluminum alloy piston (13 per cent copper) has a very thick domed head designed to drive the air into the combustion chamber. Originally the head was maintained at the highest possible temperature, there being no cooling water, and special material having to be used to withstand the high temperature. As it is now produced, the head is a normal cast-iron type, water cooled, and held to the cylinders in the usual way by means of studs.

An air pump driven off the front end of the crankshaft delivers air to the cylinder through the lower inlet ports A, thus tending to scavenge the spent gases through the upper ports B. By reason of the bottle neck and the shape of the piston, the air is driven into the combustion chamber at considerable velocity and high turbulence is created.



Injection valve of Peugeot engine

Fuel Pump

Direct injection of the fuel is obtained from a plunger type pump and an injector C mounted centrally in the cylinder head. The liquid fuel coming in contact with the air projected into the combustion chamber at high velocity, is completely

Peugeot with 43 Cu. In. Engine

The above photograph shows the 5 hp. Peugeot small car of which two examples have been shipped to this country to be demonstrated to American manufacturers. The four-cylinder engine has a bore of slightly less than 2 in. and a stroke of about 3⅜ in., making the piston displacement 43 cu. in. or less than one-quarter that of the Ford

broken up and homogeneous mixture is obtained. With a compression ratio of 12, the heat developed is sufficient to fire the charge, particularly when the combustion chamber has reached a normal working temperature.

For starting up from cold, a special plug and electric current are made use of. The plug consists principally of a small coil of platinum wire, through which the current of a small battery can be switched, thus heating the wire and causing it to fire the charge at the end of the compression stroke. After a few revolutions of the engine the current is switched off. Variation of engine speed is obtained by controlling the timing of the pump and the length of the stroke of the plungers.

Weighing 10 pounds per horsepower, the Peugeot engine compares favorably in the matter of flexibility with the normal gasoline engine and in addition to using cheaper fuel is particularly economical when running under light loads.

Rapid Progress of Motorship

TWO notes from abroad are indicative of the rapid growth in popularity of the motorship. One relates to an address made by Lord Kylsant, chairman of Harland and Wolff, Ltd., at the thirty-seventh annual meeting of the King Line, in which he said that many of those who were listening to him would live to see the time when steamers would be as rare a sight as sailing ships are now. The motorship had definite advantages as compared with the steamship. The present fleet of the King Line comprised nine steamships, with an average age of seven years, and as soon as the time for renewal came he intended to make them all motorships, as there was no doubt that the tramp motorship was the vessel of the future.

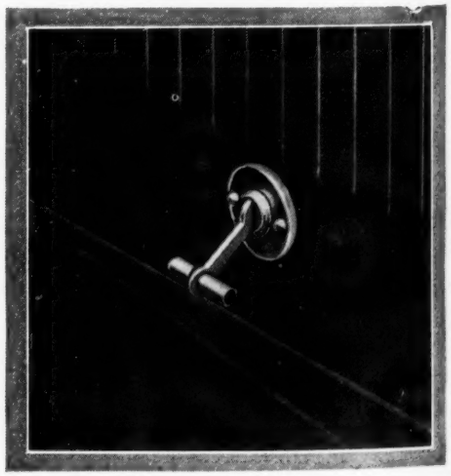
The other item is to the effect that four twin-screw motor passenger liners are being built for the Brazilian Government in Italy at the Monfalcone Yard of the Cantiere Navale Triestino. The engines for these ships will be built by the Fiat Company of Turin. They are said to be four-cylinder, two-stroke, single-acting engines designed to develop 1750 hp. each at 125 r.p.m., thus giving a total shaft horsepower of 3500. The auxiliaries of these vessels will be driven by Fiat Diesel-electric generator sets.

Wiley Hood Fastener

BY means of a new hood fastener now in production by the Wiley Manufacturing Co., 1033 Mt. Elliott Ave., Detroit, it is necessary to use only two fingers of one hand to unlock, raise or lower and relock the hood of an automobile. In addition to the more convenient operation and cleaner appearance, the new hood fasteners have fewer parts and their cost of installation is said to be less than the conventional form of latches and handles. When the hood is lowered, slight pressure on the handle fastens the entire side of the hood.

There are just two moving parts in the Wiley fastener. These consist of a slotted cam at the other end of the fastener handle and a special spring steel rod with a U-shaped cam formed in the rod at either end, the latter being placed inside the hood. The U-shaped cams at the ends of the rod bear against T-brackets fastened to the radiator shell and cowl respectively, and the cams at their highest position exert a downward strain on the hood holding it securely in place. The rod is actuated through 180 deg. by another cam on the end of the fastener handle which is connected with a small crank formed in the rod at this point. When the hood is fastened there is a slight bowing in each half of the rod which, besides making the device more secure, tends to reinforce the side of the hood and prevent weaving.

It is not necessary that the operating handle be placed in the middle of the hood. When the design of any particular car makes the central position undesirable from the point of accessibility, the fastener can be moved in either direction without changing the operation.



Wiley hood fastener installed on car

IN a quarterly statement published in the house organ of Robert Bosch, A. G., Stuttgart, it is stated that business slackened materially during the last quarter of 1925. The magneto branch of the works, which works to the extent of 80 per cent for the export market, was fully occupied and during December reached the highest monthly production since 1912. But in all other departments, which even as late as October worked overtime, it was necessary to reduce working hours and personnel, and the total number of employes of the firm has decreased by 1086 to 10,110 shop and 2589 office workers since October 1, 1925.

EDITORIAL

Visiting the Dealers

EVERY year automotive sales executives are piling up higher Pullman mileages. There is little tendency among factory men to sit back in their chairs behind the big desks at the home office. Some executives are rarely in their offices; nearly all of them today maintain a good personal contact with the field.

The real advantage of this practice, of course, is in the knowledge of field problems and the "feel" of retail conditions which the factory men get and which helps them to decide future policies more intelligently. They perform a certain amount of service also in making suggestions and talking over problems with the dealers and distributors whom they visit.

There is a growing feeling also that the small towns and the little dealers shouldn't be neglected in these journeys. Obviously, it would be physically impossible for a factory sales manager to visit any great number of small-town retailers, but he can readily make enough calls in this part of his organization to get a first-hand picture of conditions. The now well-known fact that over 50 per cent of all the cars have been sold in towns of less than 10,000 population may well be kept a permanent part of the sales manager's marketing picture.

Canada and the Tariff

THE question of tariff rates on motor vehicles and parts is receiving considerable attention from the neighboring country on our north.

Advocates of lowering the present 35 per cent Canadian tariff admit that the reasons for a tariff appear to be sound—that the smaller population of the Dominion, higher prices for raw material and machinery, and the greater margin of profit necessary because of the smaller volume of business done by Canadian plants all seem to point to the necessity of a tariff if the Canadian factories are to continue in existence. But, they add, Canadians in general are just as anxious to own cars as Americans, they have similar desires and yet in all Canada there are only about 720,000 motor vehicles—one for every 12 persons. Lowering the tariff so that more Canadians could buy cars would open a market for hundreds of thousands of motor vehicles.

Friends of the present tariff point out, on the other hand, that during 1925 about $45,000,000 of vehicles, engines and parts were imported from the United States while the total amount of money spent in Canada during the same period for machinery and supplies for the automotive industry was less than $40,000,000. They state that the manufacture of these importations, if all had been produced in Canada, would have had an immense influence on the industrial welfare and prosperity of the Dominion.

At the present time there is considerable agitation, particularly from the agricultural regions of Western Canada, to lower the tariff. No prediction is possible now as to what action, if any, will be taken but undoubtedly automotive manufacturers both here and in Canada will watch developments with interest.

Sales Resistance Abroad

IN European countries which manufacture automobiles, American products seem to be receiving considerable opposition on a nationalistic as well as on a commercial basis. An article in this issue by W. F. Bradley tells of some of the rather intense sales resistance which is being brought to bear against American cars in the French market.

American quality is belittled, salesmen are refused an audience at certain factories if they make their calls in an American vehicle, and strong appeals in some magazines are being made to the public to refrain from buying American cars on a patriotic basis. Added to this campaign against American products is a 45 per cent duty.

But in spite of these handicaps, more American cars were sold in France last year than in 1924 or 1923.

Our major export market, of course, is outside those countries which have an automotive manufacturing industry of their own, but even in areas such as France our products doubtless will be able to continue to sell in quantities commensurate with their effectiveness and usefulness.

Better Statistical Data

PROGRESS is being made in clarifying and making more adequate the various sets of statistical data necessary to proper planning of automotive sales and production. Registration figures, production figures, export figures, information on new car stocks and used car stocks—all statistics of this sort are available in more accurate and more detailed form than they were five years ago.

Economists and automotive forecasters working with these data sometimes are inclined to think that they are getting better instead of worse. This is only because closer study in recent years has revealed clearly the faults and discrepancies in the various sets of figures, while previously a good many of them had simply been accepted at face value.

Revelation of certain soft spots in the figures has made intelligent and correct interpretation possible and has resulted in better methods of compilation and recording of original data in many instances.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Thursday, April 15, 1926

Increase in Retail Sales Justifies New Car Stocks

PHILADELPHIA, April 15—With automotive sales showing the normal spring increases the general situation in the industry continues to be satisfactory. There has been little change in the output rate at the factories and several of the largest plants are turning out cars and trucks at record-breaking rates. Dealers' stocks of unsold cars are somewhat high, if comparison is made with the situation existing a year ago at this time, but sales so far have apparently justified the heavier stocking against the active selling season.

Sales to date this year are figured roughly as 20 per cent over those of the corresponding period of 1925. Production has been running until the last two or three weeks at an even greater rate of increase, but it must be considered that stocks held by dealers at the beginning of spring a year ago were inadequate to meet the demand that developed. Hence manufacturers are naturally desirous of having their dealers in position to give prompt deliveries at all times.

So far the factories have been in the main justified. Sales during the early part of the year were above the normal for the season, and this was taken to mean that spring demand would also be better than normal. This expectation has been borne out, and manufacturers reporting weekly sales show that each week in March and early in April recorded substantial gains over the week immediately preceding.

It cannot be ignored however, that the heavy production of cars and trucks has placed serious burdens on the distributors and dealers. The pressure to sell new cars has piled up used car stocks mainly taken on trade-ins at a time when there was little demand for the second-hand vehicles. Many dealers in the last few years have learned the wisdom of conducting their used-car transactions on a sound basis, and most of the factories are doing all in their power to help, but the fact that stocks of these vehicles are probably higher now than they ever were before emphasizes the need for even greater efforts to solve what is clearly the most serious problem of the industry.

Edsel Ford Sailing

NEW YORK, April 14—Edsel B. Ford, president of Ford Motor Co., is in New York preparatory to sailing for Europe. The nature of Mr. Ford's trip has not been divulged though it is indicated as being largely of a vacation character.

Eaton Shipments Gain

CLEVELAND, April 14—March shipments of Eaton Axle & Spring Corp. totaled $1,336,000 compared with $673,000 in March, 1925.

Truck and Bus Gain Seen in 1st Quarter

Increase of 12 Per Cent Indicated by Early Figures—Replacement Sales High

NEW YORK, April 15—With first quarter production running about 12 per cent over the 1925 quarter there is every indication that truck and bus output this year will exceed last year's record production of 497,107.

First quarter production, with March estimated, was 121,414 compared with 107,649 in the 1925 quarter, a gain of 13,765. In the first quarter this year 24.4 per cent of the 1925 record total was produced.

Second quarter gain over the corresponding quarter last year is expected to be considerably larger than the first quarter increase. More trucks are being produced this spring than ever, not only because of the demand for them by new users but also because sales for replacement are larger than ever.

Present Market Large

The replacement market was never so large, because trucks are in demand now to replace those built five, six and seven years ago, when production first assumed large proportions. The increasing importance of the replacement market added to the growth in demand from new users as reflecting healthy business conditions and good roads extension throughout the country, are the chief reasons for the expectation that 1926 will exceed the record production of 1925.

The figures given here include buses as well as trucks. Probably not more than 3500 of the 121,414 units produced in the first quarter were buses, with about 1500 of these credited to January and February, and about 2000 to March, and with April expected to exceed this 2000 in accordance with the usual increase in bus output at this season.

REACTION IN STOCKS HELPS, SAYS JORDAN

CLEVELAND, April 15—The reaction in the stock market is seen by E. S. Jordan, president of Jordan Motor Car Co., as a factor making for good business in that it will result in inventories being watched carefully, production kept in step with sales and over-production dangers in all lines avoided.

Mr. Jordan finds that general business conditions, fundamentally, are very satisfactory—even more so than at this time in 1925. Retail sales of automobiles throughout the country are showing steady increases each week and with spring weather nearing it will become apparent that the demand for automobiles is greater than ever.

The great thing about the automobile business, the thing that makes it fundamentally sound and the demand constant, is that while one man may delay buying a car for a month, no man ever stops using his car.

Autocar Outlines Operating Plans

PHILADELPHIA, April 15—L. L. Woodward, recently named president of the Autocar Co., succeeding D. S. Ludlum, was formally elected to the presidency at the meeting of the new board of directors this week. Other officers named were J. S. Clarke, vice-president; W. T. Savoye, vice-president; J. C. Taney, treasurer, and R. T. Anthony, secretary and assistant treasurer. W. W. Norton is production manager and R. P. Page, Jr., formerly New England district manager, has been named sales manager.

The company will not undertake any extensive financing at this time. New money to the extent of $250,000 has been made available through the sale of preferred stock to present holders. Additional cash will be provided by banks if required pending the formal refinancing which is to come later. For the present the efforts of the new officials will be devoted to placing manufacturing operation on a more efficient basis, and also toward developing better distribution.

Directors of the company were elected at the annual stockholders' meeting April 9, as follows: L. L. Woodward, J. S. Clarke, J. C. Taney, R. T. Anthony, W. W. Norton, H. Arthur Smith, Herbert Sinclair, Edwin A. Fitts, W. W. Battles.

Wilmer Named Dodge President; Haynes Chairman; Grahams Resign

New Executive Will Assume Immediate Direction of Detroit Company, Resigning as Goodyear Chairman—Dodge Brothers Obtain Complete Ownership of Graham Brothers Co.

DETROIT, April 14—Edward G. Wilmer, former chairman of the board of Dodge Brothers, Inc., was elected president by the board of directors today and the former president, Frederick J. Haynes, was made chairman of the board. Mr. Wilmer will assume active charge of Dodge Brothers affairs. He will take up residence in Detroit and resign as chairman of the board of Goodyear Tire & Rubber Co.

Ray, Robert and Joseph Graham have resigned as vice-presidents of Dodge Brothers, having held these positions for the last four months. Their resignations, which were accompanied by expressions of good will for the Dodge management, were coincident with the decision of the board to exercise its option and purchase the remaining 49 per cent of Graham Brothers stock, giving complete ownership of the truck company to Dodge Brothers, Inc.

Graham Brothers last year produced 24,298 vehicles and this year has been bettering its former rate by a wide margin.

A. T. Waterfall, H. H. Springford and A. Z. Mitchell remain as Dodge vice-presidents as a result of their re-election by the board today. Fred Albertson, of Los Angeles, and C. M. Bishop, of Brooklyn, were formally elected as dealer directors. A. Charles Schwartz, a large stockholder, was also elected a director.

Wilmer Prominent Executive

Widely known for his achievements in industrial organization and management Mr. Wilmer has successively held executive positions in the mining, chemical, steel and rubber industries. Perhaps his most notable accomplishment was the reorganization and rehabilitation of the Goodyear company. During the war he was head of the buying section in charge of trench warfare materials. At various times he was vice-president of the Newport Mining Co. and of the Steel & Tube Co. of America.

The announcement that Mr. Wilmer would assume active direction of the Dodge interests was not unexpected in view of the great confidence known to be placed in him by Dillon, Read & Co., which purchased Dodge Brothers, Inc., a year ago. Clarence Dillon, head of Dillon, Read & Co., accompanied a large group who came from New York for the meeting today. Mr. Dillon and Mr. Wilmer have been friends and associates since 1910.

Mr. Haynes entered the transportation industry in 1895 as assistant to John F. Dodge when the latter was general manager of the National Cycle & Automobile Co. of Hamilton, Ont. He became general manager when Mr. Dodge went to Detroit. Later he entered the Dodge Brothers' organization and assumed the presidency of that concern in 1920 after the death of Horace E. Dodge.

The progress of the company during the years of Mr. Haynes' incumbency made him a dominating factor in the industry. He is generally credited for the continuance of the policies of the Dodge

(Continued on page 671)

E. G. Wilmer

Who becomes president of Dodge Bros., resigning as chairman of Goodyear Tire & Rubber Co.

Fred. J. Haynes

Retiring president of Dodge Brothers, who becomes chairman of the board

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, April 15—Stock prices continued relatively firm last week, while commodity prices resumed the downward trend of recent months. Industrial activity remained at a high level. Trade was fairly active, but continued to feel the effects of unfavorable weather, especially in retail lines.

STEEL PRODUCTION

Steel ingot output last month was the largest ever recorded, reaching a total of 4,491,689 tons and a daily average of 166,350 tons, as against 158,525 tons in the preceding month and 161,482 tons a year ago. Unfilled orders on the books of the United States Steel Corp. on March 31 amounted to 4,379,935 tons, as compared with 4,616,822 tons at the end of February and 4,863,564 tons on March 31, 1925.

CAR LOADINGS

Railway freight car loadings continued to exceed last year's figures during the week ended March 27, with a total of 967,838 cars, as compared with 977,209 in the preceding week and 932,769 in the corresponding period last year. Net operating income of Class 1 railroads in February was $63,289,297, as against $65,151,053 a year earlier.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended April 7 were slightly below the figure of a week earlier, but 21.6 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 150.7 last week, as against 151.8 in the preceding week and 151.7 a fortnight earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks declined $61,200,000 during the week ended April 7, with decreases of $53,800,000 in discounts and $19,900,000 in open market purchases and a gain of $12,200,00 in Government securities. Note circulation declined $3,600,000 and deposits $44,900,000, while reserve increased $13,800,000. The reserve ratio rose from 73.4 to 74.6 per cent.

Loans of reporting member banks increased $104,000,000 during the week ended March 31, the principal gain being in loans secured by stocks and bonds. Investments declined $80,000,000, while borrowings from Federal Reserve banks increased $1,000,000 and net demand deposits $159,000,000.

MONEY

Money rates were distinctly easier last week, the range for call loans being from 4 to 4½ per cent, as against 4 to 5½ per cent a week earlier. Time loan rates ranged from 4¼ to 4½ per cent, as compared with 4½ to 4⅝ per cent in the preceding week.

March Retail Sales Set New G. M. C. Mark

Gains for Month and Quarter Run 50 to 66 Per Cent—Dealer Stocks Low

NEW YORK, April 15—March retail sales of all divisions of General Motors Corp. including overseas sales, were 106,051, compared with 70,594 in March, 1925, a gain of 34,457 or 50 per cent, and establishing a new monthly record for the corporation. A. P. Sloan, Jr., president, said the importance of the record may be appreciated when considered in connection with the fact that in March the sales potential is less than in April on account of the seasonal trend. The previous high monthly record was established in April, 1923, with 105,778 retail sales.

For the first quarter of 1926 retail sales were 224,720 against 135,766 in the 1925 quarter, a gain of 66 per cent. March sales to dealers were 113,341 against 75,527 in March, 1925, a 50 per cent gain. First quarter sales to dealers were 280,906 against 155,315, a gain of 81 per cent. Chevrolet production in the first quarter of 1925 was reduced by introduction of a new model.

Near Shipment Total

March sales to dealers in 1926 exceeded retail sales by only 7290.

Mr. Sloan described the unsold car stocks in dealers hands and in factory branches as in line with seasonal requirements with no excess. He expects one or two divisions will lose sales because of insufficient stocks.

Star Sales Show 57 Per Cent Gain

NEW YORK, April 12—Colin Campbell, vice-president of Durant Motors, Inc., announces that Star factory sales for the first quarter of 1926 exceeded those of the 1925 quarter by 57 per cent. Figures for the period follow:

Month	1925	1926	Increase	Per Cent
January	4,968	8,405	3,437	69
February	5,314	10,392	5 078	95
March	9,915	12,898	2,983	30
Total	20,197	31,695	11,498	57

Mexican Exports Grow

LAREDO, TEXAS, April 14—Custom house figures compiled here show that the value of American goods and merchandise exported to Mexico through this port of entry for the month of March was $3,702,040, while the consular duties collected amounted to $185,102. The quarterly report affords a good comparison to show the monthly increase in valuations of goods exported to Mexico. During the month of January the total valuation of goods and merchandise exported to Mexico amounted to $3,050,726, with consular duties collected of $152,536.30. For the month of February the total valuation of goods and merchandise amounted to $3,227,164, with consular duties paid of $161,358.20. The quarterly report summarizes the total valuation of merchandise and goods exported to Mexico through the port of Laredo for January, February and March at $90,979,930, with consular duties collected during that period of $498,996.50.

March Rim Totals Show Upward Trend

CLEVELAND, April 14—Rim production figures for March as issued by the Tire & Rim Association of America, Inc., show a total of 2,471,400 as against 2,332,733 in March, 1925. For the three months ended March 31, the production total is 6,620,104 as against 6,116,134 in the 1925 quarter. Production totals in principal sizes are as follows:

Size	March 1926	March 1925	3 mos. 1926	3 mos. 1925
Clincher				
30x3½	415,880	335,874	1,105,019	1,543,045
Balloon				
28x3½	921,659	788,936	2,497,749	1,325,606
28x4	267,292	277,240	675,254	670,171
29x4	322,247	130,050	883,806	311,219
30x4½	178,028	121,323	525,959	314,588
30x5	30,506	41,318	76,846	80,938
31x5	35,913	49,542	126,611	136,482
High Press.				
30x3½	13,197	51,009	38,813	222,383
32x4	13,879	30,580	47,161	67,966
32x4½	36,821	54,821	120,965	171,676
Truck 20"				
30x5	69,328	83,217	143,671	200,925
Truck 24"				
36x6	7,642	2,174	25,355	15,056

Inland Manufacturing to Enlarge Capacity

DAYTON, OHIO, April 14—Inland Mfg. Co. has started a program of enlarging its capacity which calls for expenditure of approximately $300,000 within the next few months. The company is a division of General Motors Corp. and is largely engaged in the manufacture of steering wheels and rubber parts. The plant has a capacity of 6000 wheels daily and has been running at this rate for several months. The wheel capacity will be increased by about 25 per cent with the new plant additions, and additional facilities for the manufacture of both hard and soft rubber automotive parts.

In addition to increasing the plant space, numerous changes in present equipment are being made to effect greater manufacturing economies.

McQuay-Norris Gains

ST. LOUIS, April 12.—Sales and production of McQuay-Norris Mfg. Co. for the first quarter of the year were the largest in the company's history according to W. K. Norris, president. March exceeded March, 1925, by about 30 per cent and each month during the quarter has shown an increase over the preceding month. Night shifts have been necessary since January at both Connersville plants and at St. Louis.

Hupp Carries Over $2,700,000 in Orders

Record Achieving First Quarter Shows Sales Exceeding Output—Exports Increase

DETROIT, April 12—Hupp Motor Car Corp. total shipments for the first three months of the year exceeded those for a similar period in 1925 by 45 per cent. Domestic shipments were 47 per cent better than those for the corresponding period last year, while the exports were 38 per cent better. The total shipments in March, 1926, were 29 per cent higher than for March, 1925, while the export shipments were 63 per cent better than in March, a year ago.

At the end of the month, on March 31, the company carried over unfilled orders for more than $1,300,000 worth of cars. Orders received April 1, for more than 1000 cars, give it more than $2,700,000 worth of unfilled orders.

According to O. C. Hutchinson, general sales manager, the demand for both the six and eight cylinder cars has been uniform throughout the country. Both models are being sold by distributors and dealers at the fastest rate they have ever attained. As a consequence, the company is planning still greater output for the coming months. It is likely that April will surpass March and that May will be larger than either March or April.

Approximately 93 per cent of the company's March domestic shipments were in closed models.

Auburn Quarter Sales Show 306 Per Cent Gain

AUBURN, IND., April 14.—Sales of Auburn Automobile Co. for the first quarter were 336 cars, an increase of 306 per cent over the same period in 1925 when 839 cars were sold. Stocks of cars in dealers' hands April 1 were declared by the company to represent not more than 15 days' supply. Export business for March totaled 152 cars as compared to 42 cars for the same period last year. In the quarter, export sales were 268 cars as against 84 in the 1925 quarter. Important sales gains have been made in many parts of the United States, the Chicago district making an especially good record, where Auburn ranked fifteenth in deliveries.

Add Klaxon Model

ANDERSON, IND., April 10—A new model has been added to the Klaxon line of signalling devices, made by the Klaxon Division of the Remy Electric Co. of this city. The new model is a vibrator or high frequency type, producing a deep-pitched tone. It is said to be of very simple design, which in conjunction with improved manufacturing processes has permitted of placing the retail price at $6.75. The Klaxon line of horns now comprises three motor-driven, three vibrator and two hand-operated types.

Steel Prices Firm Though Buying Falls

Decrease in Unfilled Tonnage Laid to Rail Shipments—Pig Iron Lower

NEW YORK, April 15—While all signs point to a slowing down in the general demand for steel and, in consequence, a lower rate of steel mill operations, these same signs were in evidence in February and March, and, for all that, March brought forth a new record in output. The Corporation's unfilled tonnage statement for March, issued on Saturday, showed a decline of 236,887 tons, but this falling off might have been solely due to shipments on old orders for rails and tin plate for which commodities no fresh orders are expected at this time of the year. Quite likely new orders for automotive requirements equalled shipments.

The unprecedented steadiness of steel prices during the last few months has made necessary almost microscopic analysis to detect any changes in the market's tone. Some market observers claim that cold-rolled strip steel is cutting more and more into sheet consumption for fender and body stock, and attribute any slight concession that may be made by one or the other sheet-roller to that circumstance. Yet automobile sheet mills seem to fare very well, averaged over the whole year possibly better than specialists in any other steel product.

The sudden flop in pig iron prices which ensued in the Pittsburgh market has had no direct effect on the steel situation. While pig iron is the most essential steel-making material, the merchant furnace price for pig iron is without effect on steel prices, but sentimentally, of course, the dip was not entirely ignored in the steel market. Whenever spokesmen for the steel industry indulged in painting roseate pictures of the outlook, consumers sense that the market needs bolstering up, and recent pronouncements of two leading "independents" are so interpreted. Special significance is attached to the prediction by one of *"fair-to-good"* business the second quarter following a *"good"* first quarter.

Pig Iron—Following last week's report, the Pittsburgh foundry iron market suddenly gave way as the result of thorough "shopping" by one consumer who bought 5000 tons on a $19 basis. In other grades and markets the weakness was not quite so pronounced, but all have since yielded to the extent of at least $1, and scrap prices have also given way. At the lower prices the market appears to have turned somewhat more active, and automotive foundries show better interest in offerings. In the Middle West some foundries are having trouble as the result of increased wage demands by molders.

Aluminum—This is the only non-ferrous metal which has not moved downward in price, and this is largely due to the heavy rate of automotive consumption. While imports are relatively heavy, importers need not shade prices to obtain orders. A technical journal points out that "never has the supply of aluminum been sufficient to meet market needs," but the new plant being built in Canada by the American producer promises to double the present world production by 1928.

Copper—Dull and under pressure by London "bears."

Lead—Storage battery manufacturers out of market which is easy.

Zinc—Production and demand are in balance. Market fairly steady at around 7c level, East St. Louis basis.

April Parts Sales Indicate New Marks

NEW YORK, April 12—There is every indication that April will be another big month in the accessory, replacement parts and original equipment business, according to Neal G. Adair, manager of the educational department of the Motor and Accessory Manufacturers Association.

Returning today from a Middle Western trip Mr. Adair said that although one or two car producing companies had reduced orders, the original equipment business was holding up well and accessory and parts shipments to the trade in general for the month would probably rise above the same month last year.

He saw no evidence of recessions, either in automotive or general business conditions. Even with poor weather automotive business had been good, and with fine weather now calling the cars on the road again there seemed to be no reason why April as a whole should not be a big business month.

New Process Cuts Cost of Aluminum Extraction

WASHINGTON, April 15—Automotive manufacturers who account for 46 per cent of all aluminum produced will be interested to learn that the Department of Commerce has been informed through consular dispatches that the Czechoslovak government has issued a patent to two local scientists, Otto Lederer and Dr. Walter Stanczak, of Prague, covering a new process for the extraction of aluminum from clay silicate and bauxite. The method has been tested by the Ministry of National Defense which has reported that aluminum free of iron and silicic acid can be produced from low grade materials at a lower cost than at present.

Rubber Imports Gain

NEW YORK, April 13—Crude rubber imports for March totaled 42,677 tons, an increase of 8763 tons over March, 1925, according to a report of the Rubber Association of America, Inc. Importations for the quarter ending March 31 were 115,441 as compared with 87,330 in the same period last year.

Tire Output Gains as Season Advances

Capacity Operation by May 1 Foreseen—Reserve Stocks Show Steady Depletion

AKRON, April 15—While production of automobile tires was substantially curtailed during February and March, indications are that the second quarter will be one of the best in the history of the industry. Akron factories are steadily increasing tire output, and are expected to be operating at capacity by May 1.

Most of the tire manufacturers are now operating full time, on a three shift basis. The major companies were working five days a week last month, and the smaller concerns reduced operations to three and four days a week.

Total production in the Akron district in April is estimated around 125,000 tires a day, compared with an output of about 100,000 early in March. Operations at the Goodyear, Goodrich, Firestone and Miller plants, which have been curtailed in some departments, are now reported on a six day a week basis. Officials of the General Tire & Rubber Co. announce that the plant, which was working four days a week, is again on full time schedules. Seiberling, India, Mason, Mohawk and other smaller companies, are reported increasing tire production from 15 to 25 per cent.

A large volume of orders is being received by tire manufacturers from both dealers and car makers, and reserve stocks are being steadily depleted.

Miller Ready to Start Rubber Reclaiming Work

AKRON, April 12—Officials of the Miller Rubber Co. plan to begin operations next week in the new rubber reclaiming plant just completed in Kenmore, about two miles from the main factory. The plant will supply practically all the company's needs for reclaimed rubber.

Turner Company Moves

OSKALOOSA, IOWA, April 10—Negotiations have been completed for the transfer of the Turner Manufacturing Co. of Cedarburg, Wis., a $250,000 concern manufacturing Simplicity gasoline and kerosene engines, from that city to a factory here. It is scheduled to begin production in Oskaloosa within 30 days.

Acme Electric Builds

CLEVELAND, April 12—Acme Electric & Mfg. Co. is increasing its floor space and manufacturing facilities to meet increased demand for its product. The company reports extensive demand for battery charging equipment coming from all parts of the United States and also a largely increased foreign buying due to radio developments.

Automotive Subjects on U. S. C. C. Program

WASHINGTON, April 15—Governor Ritchie of Maryland, Dr. Julius Klein, Bureau of Foreign and Domestic Commerce and A. J. Brosseau, of Mack Trucks, Inc., will be speakers at the fourteenth annual meeting of the Chamber of Commerce of the United States to be held May 10-13.

Subjects of interest to the automotive industry will be discussed on the second day of the conference when a report on compulsory automobile insurance and vital statistics will be made. On the same day the chamber's committee on transportation and communication, officered by A. L. Humphrey, president of the Westinghouse Air Brake Co., and Col. A. B. Barber, will discuss bus terminals in relation to the traffic problem and what commercial organizations can contribute to the solution of the traffic problem. One of the major subjects, also, will be "Relations of the States to the Federal Government" which will include Federal aid for highways.

Sets Mileage Allowance

WASHINGTON, April 15 — Seven cents a mile compensation for use of private automobiles has been fixed by the Treasury Department as the actual cost of operation, plus compensation for the vehicles use.

MUST MIX ALCOHOL IN GASOLINE SALES

WASHINGTON, April 15—A unique form of automobile taxation is reported to the Automotive Division of the Department of Commerce by Vice Consul H. D. Myers at Panama.

Under the provisions of a recent Panaman decree, all gasoline consumed in the country for fuel or power shall be mixed with alcohol of 40 degrees Cartier in such proportions that the mixture shall contain 95 per cent gasoline and 5 per cent alcohol.

The object of the law is to create a greater alcohol market for the purpose of stimulating the sugar industry of the country.

Zenith Foundry Formed

MILWAUKEE, April 12—Automotive castings will be a specialty of the Zenith Foundry Co., of Milwaukee, which has just been incorporated with a capital stock of $30,000 by a group of men indentified with the iron, steel, automotive and hardware industries. The principals are Edward T. Freeman, vice-president of the Wisconsin Grey Iron Foundry Co., West Allis; W. Raymond Tanner, representative of S. Obermayer Co., foundry supplies, and Clarence H. Mueller, vice-president of the Philip Gross Hardware Co., Milwaukee.

Argentine Favors Cabriolet Bodies

NEW YORK, April 12—Albert Fehling, of Fehling Hnos., Buenos Aires, who has been Cadillac distributor in the Argentine for 23 years, and who is also distributor for Wills Sainte Claire and Federal trucks, sailed for his home Saturday on the American Legion, after spending two months visiting automobile factories in this country.

Mr. Fehling's major mission to the United States was to look into the custom-build body field, and before sailing he had placed orders with two of the exclusive custom-body builders of the East for full collapsible cabriolet types, which are in constantly increasing demand in Argentina. Over 20 per cent of cars sold annually by Fehling Hnos., are highest class custom-built types, which demand is constantly increasing.

New Mechanics Plant

ROCKFORD, ILL., April 14—The Mechanics Machine Co., manufacturer of Motor vehicle transmissions, has let the contract for a six story factory building to cost $175,000, necessary to take care of expanding business. The main offices and the designing and engineering departments are to be moved to the new structure while the factory and shop department will be an extension of plant five which has become too small.

Developments of the Week in Leading Motor Stocks

NEW YORK, April 15—Trading on the New York Stock Exchange during the past week was comparatively dull and for the first time in many months a full day's turnover dropped below the million share mark. The smaller volume indicated that the urgent liquidation which caused the sharp breaks of preceding sessions had, for the time being, spent itself. With the so-called "public" taking no active interest in security prices, trading was largely of a professional character. As the market showed a tendency to become active on the decline, the bears directed their short-selling drives against issues in which it was hoped to bring about further liquidation and uncertainty by depressing prices. Those stocks which had showed the most pronounced weakness and lack of resistance were singled out for these sallies.

On several occasions the professional efforts in this direction were launched against the motors with particular success as affecting Hudson. This stock was under selling pressure during the early part of the week which brought out further liquidation and resulted in a decline to new low levels on the movement. Selling was accompanied by reports that the company was laying off a large number of its employees, although published reports from Detroit indicated that shipments were still going forward at the rate of 1500 cars a day, which was the schedule in effect during the latter part of March and early April.

Jordan Motors also displayed pronounced weakness during the week on publication of more complete figures covering its operations last year. Some statisticians figure that earnings in 1925 failed to cover dividend requirements and uncertainty is felt over the dividend outlook. With the company on a larger production schedule this year, it may be necessary to conserve cash resources by sacrificing dividends unless profits show a sharp increase. However, Jordan is still selling relatively high in comparison with other $3 dividend stocks like Chrysler and Moon, due partly to the small floating supply in the Street, as a large portion of the 126,000 shares of common stock outstanding are understood to be held by insiders.

There was some talk of a bull pool resuming activity in Willys-Overland common which appears out of line on the basis of last year's earnings and this year's prospects. Little headway was made in advancing the stock, however, due to weakness in other portions of the motor list.

Nash and General Motors among the active issues continued to give a good account of themselves. Heavy selling of Nash seems to meet good buying around the 52-53 level, and many tape-readers are waiting for the stock to break this resistance point on volume as a signal for a further decline. The stock, because of its $2 dividend rate and the large increase in the floating supply occasioned by the 900 per cent stock dividend early this year has become a prominent bear target.

General Motors also appears to meet good buying as it approaches 115. There is any quantity of favorable news on the company's business to account for its strength. The earnings report for the first quarter is expected to be issued around May 1, and to show earnings of at least $6 a share for the common, although some estimates place net as high as $10 a share due to the unusually favorable showing which the corporation made in March. Shortly after the report is issued, directors will meet to consider dividends, and in some quarters an extra of $3 a share is looked for in addition to the regular quarterly dividend of $1.75 a share. At the previous meeting General Motors directors increased the rate from $6 to $7 annually and at the last meeting in 1925 they declared an extra dividend of $5 a share.—E. S.

Permanent Exhibit to Aid GMC Sales

Prospects Will be Sought at Atlantic City Display for All Products

DETROIT, April 15—The General Motors Corp. permanent exhibit at Atlantic City, announcement of which was made by A. P. Sloan, Jr., president, this week, will be much more than an advertisement of the products of the corporation, it was learned here today. It is planned to make the exhibit a definite aid to the General Motors sales organization throughout the country.

With an approximate 20,000,000 persons visiting Atlantic City annually, it is expected that virtually all of these will see the exhibit and that a certain proportion will be so much interested in the products that they will permit their enrollment as prospects. The exhibition staff will take names and even deposits but these will be passed along to the dealer in the home town of the prospect. The dealer will be required to report periodically to the corporation on blanks prepared for that purpose, his progress in completing the sale.

The exhibit will be located on the Steel Pier with 22,000 square feet of floor space fronting directly on the boardwalk. It will include Chevrolet, Pontiac, Oldsmobile, Oakland, Buick and Cadillac cars, GMC trucks, and also the products of Yellow Truck & Coach Mfg. Co., Fisher Body, Frigidaire, Delco farm lighting and power plants and various General Motors parts and accessories. Complete products will be stressed rather than manufacturing processes or technical details. Moving pictures, however, will be shown of the operations at the factories.

At night the exhibit building will be illuminated by an animated sign 65 feet long and a fixed electric sign 290 feet long. The exhibit will be thrown open in July.

The permanent exhibit appeals to the General Motors organization not only as an immediate source of advertising and sales but also as an institutional publicity of the best sort, designed to fix in the public mind the thought of General Motors as an institution in back of the products bearing the names of its divisions.

Reo Adds Improvements to 1¼-ton Speedwagon

LANSING, April 14—With the announcement of a new series of 1¼-ton Reo Speedwagon chassis, prices have been increased $55 on both four and six-cylinder models. The new prices are $1090 and $1240, respectively.

The larger or 2½-ton Reo Speedwagon chassis has not undergone any mechanical or body improvements and the price remains unaltered at $1985.

Body improvements in the new 1¼-ton Speedwagons are to provide for better general appearance, increased comfort for the driver, especially with regard to easy steering, and a lowering in the body height to facilitate loading. Other modifications include lengthening wheelbase by 2 in., locating gasoline tank under driver's seat with the fuel feed by the vacuum system, and two-filament headlight bulbs.

Gas-Electric Bus Announced by Mack

NEW YORK, April 15—International Motor Co. has announced a gas-electric bus chassis made up of the standard Mack city type bus engine and parts with the addition of General Electric electrical units. This bus differs from other American design gas-electrics in the number of electric motors used, the Mack bus using but one motor and retaining the standard double reduction rear axle. Present production is confined to 25 and 29-passenger city type buses of 196 and 225 in. wheel base.

The generator is self-excited and is rated at 125 volts, 200 amp. at 1200 r.p.m. The engine is a four-cylinder job with demountable head cast in pairs of 4¼ in. bore and 5 in. stroke. Pistons are aluminum alloy; crankshaft and timing gears are case hardened and counterbalanced; connecting rods are tubular steel; horsepower rating is 28.9.

The front end of the generator is bolted to the flywheel housing while the rear end is supported by a drop forged cross bracket. The engine and the generator are mounted on five rubber shock insulators to absorb vibration. The single motor is a G. E.—1101 rated at 125 volts, 140 amp. at 1100 r.p.m. It is of the series type and is fan ventilated. It is mounted on three rubber shock absorbers and is connected to the drive shaft through a universal joint.

The motor does not protrude above the floor level although the standard Mack clearance of 9½ in. has been retained. The additional weight made necessary by gas-electric drive is 1400 lb. which brings the weight of the 25-passenger bus empty to 11,300 lb., and of the 29-passenger job to 12,130 lb.

Wilmer Dodge President; Haynes Board Chairman

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Brothers, and for the development of new policies which kept the company ever in the forefront, not only with regard to its manufacturing performances, but in the development of its distribution efficiency.

In latter years Mr. Haynes has manifested a desire to retire from the active direction of the company, but he remained at the request of the Dodge family and latterly at the instance of the Dillon, Read company. In the chairmanship he will continue to give his active cooperation to the new executives without being charged with the responsibility of the presidency.

Financial Notes

Kelly-Springfield Tire Co.—Redemption of $500,000 principal amount of this company's ten-year eight per cent sinking fund gold notes issued under a trust agreement dated May 15, 1921, will be made on May 15 next at 110 per cent and accrued interest, according to notice from the Central Union Trust Co. of New York, trustee.

India Tire & Rubber Co. An issue of $400,000 of this company's 7 per cent cumulative preferred stock, $100 par, was offered at $98 a share and accrued dividends in Cleveland, the proceeds to be used for additional working capital.

Fisk Rubber Co. Directors have declared an initial dividend of $1.75 a share on the first preferred convertible stock and a dividend of $1.75 a share on the first preferred stock payable May 1.

Hood Rubber Co. has declared initial quarterly dividend of $1.88 on the new 7½ per cent preference stock and regular quarterly of $1.75 on the preferred, both payable May 1, to stockholders of record Apr. 20.

Briggs Manufacturing Co. for 1925 reports net income $8,141,656 equal to $4.07 per share on 2,000,000 no par common outstanding and comparing with $11,135,576 or $5.56 per share on 1,999,688 shares in 1924.

American Bosch Magneto Corp.—Stockholders have approved the plan to sell the corporation's starting, lighting and battery ignition business to the Electric Auto-Lite Co.

Nash Motors Co., with its subsidiary Ajax Motor Co., shows net income for the quarter ended Feb. 28, 1926 of $4,137,508, which compares with $3,099,293 in the same quarter of 1925.

Sterling Motor Truck Co., Milwaukee, paid its thirty-first consecutive quarterly dividend of 2 per cent, on April 1. Business of the company is reported showing satisfactory increase over previous years.

Akron Rubber Reclaiming Co. Capital stock will be increased from $500,000 to $1,000,000 following approval by company stockholders.

Moon Motor Car Co. has declared a regular quarterly dividend of 75 cents a share, payable May 1, to stockholders of record April 19.

B. F. Goodrich Co. has notified the New York Stock Exchange of a proposed reduction in authorized preferred stock from $42,472,000 to $41,284,000.

Fisher Body Corp. has declared regular quarterly dividend of $1.25 payable May 1 to stockholders of record April 20.

Kelsey Wheel Co. has declared regular quarterly preferred dividend of $1.75 payable May 1 to stockholders of record April 20.

Wills Prices Reduced

DETROIT, April 12—Prices on its six-cylinder line have been reduced by Wills Sainte Claire, Inc., effective immediately. The new price on the traveler and roadster models is $2700; the five-passenger sedan $3150, and on the limousine $3350.

Men of the Industry and What They Are Doing

Two M.A.M.A. Officials Take New Positions

The resignations of G. C. Hall, show manager, and Herman Deuster, manager of the traffic department, of the Motor and Accessory Manufacturers Association are announced. Mr. Hall had been connected with the association for fifteen years. He is joining the sales division of the Fred J. French Co., New York, creators of the French plan of building management and financing properties.

Mr. Deuster will take charge of the traffic department of Briggs Mfg. Co., Detroit. He had been connected with M. & A. M. A. traffic activities for the past five years and previously was with the Erie and Ontario & Western railroads.

The appointment of successors has not been announced.

New Peerless Directors

Charles A. Tucker, general sales manager, and C. H. Larson, New York distributor, of Peerless Motor Car Corp., have been elected to the board of directors of the Peerless company, the directorate being increased from eleven to thirteen members.

Mr. Tucker has been with the Peerless company for the past year. Previously he had been general sales manager of Olds Motor Works during the incumbency of Edward VerLinden as president there, resigning to resume Oldsmobile distribution in the middle west. On the appointment of Mr. VerLinden to the Peereless presidency, Mr. Tucker rejoined him in the sales capacity.

Mr. Larson heads the Cutting-Larson Co. of New York and has been engaged in automobile distribution since the bicycle days.

Elliot Joins Willys

W. A. Elliot, former St. Louis branch manager for Dodge Brothers, Inc., is now affiliated with the sales department of Willys-Overland, Inc. He was associated with Dodge Brothers sales work for more than five years both in the field and at the home office. Previously he had been associated with White Motor Co.

MacPherson on Trip

C. D. MacPherson, general sales manager for the Wood Hydraulic Hoist Body Co., Detroit, is surveying the sales territory in New York, New England and Pennsylvania.

Frank H. Dewey, formerly assistant general manager of this company, recently became general manager.

Leonard Research Manager

George O. Leonard has been appointed manager of the research department of Campbell-Ewald Co., H. T. Ewald, president of the company has announced.

L. F. Murphy

New Velie sales manager

Harger Joins Overland

Rollin N. Harger has assumed connection with the sales department of the Willys-Overland Co., according to a factory announcement. Mr. Harper was for several years managing director of Dodge Brothers Great Britain, Ltd. He will shortly leave the Toledo factory and return to England in connection with sales work between the domestic organization of Willys-Overland, Inc., and Willys - Overland - Crossley, Ltd., the British manufacturing plant of the company which serves all of continental Europe and other territories.

J. E. Mills Resigns

J. E. Mills, nationally known through his talks before various associations on the application of the budget system to service station management, has been appointed Commissioner of Supplies and Purchases of the City of Detroit. Mr. Mills is resigning his position as service manager of the Detroit branch of the Packard Motor Car Co. to take up his new work.

Clarke Sells Interest

James E. Clarke has sold out his interest in the Clarke-Stevens Co., New England distributors of the Rickenbacker line. He was formerly sales manager of the National Automobile Co. at Indianapolis before coming to Boston. Mr. Clarke has some extensive radio interests which will occupy his time for the present.

Jones Heads Coast Sales

Ernest S. Jones has been appointed sales manager for the Durant Company of California, according to announcement by Norman DeVaux, vice-president. Mr. Jones has been connected with the sales department of the Star car for several years.

Foreign Newspapermen to Visit Major Plants

One hundred representatives of Latin-American newspapers who have been attending the Pan-American congress of journalists in Washington, will visit the principal centers of the automotive and rubber industries late this month.

H. H. Rice, assistant to the president of General Motors Corp., will be in charge of the western tour which will be conducted under the auspices of a committee of the Pan-American Confederation of Highway Education, composed of Dr. Lees Rowe, chairman; J. Walter Drake, assistant secretary of commerce, vice-chairman; W. K. Carr, assistant secretary of state; T. H. MacDonald, chief of the United States Bureau of Public Roads; Fred I. Kent, vice-president of the Bankers Trust Co., R. D. Chapin, vice-president of the National Automomobile Chamber of Commerce, and W. O. Rutherford, former president of the Rubber Association of America.

Kauderer Resigns

Charles Kauderer, who during the past several years has served in the capacities of factory and production manager and chief engineer for the Mullins Body. Corp., Salem, Ohio, has resigned. Mr. Kauderer has made no announcement of his future plans other than that he plans a vacation trip. He is widely known in the industry, particularly as a designer and builder of dies and tools.

Bell With Columbia

W. H. Bell, for a number of years Pacific Coast manager for the Kelly-Springfield Tire Co., and a former member of the executive committee of the Rubber Association of America, has joined the Columbia Tire Corp. of Portland, Ore., with whom he will function as a merchandising and distributing executive.

Fitness With Belflex

R. J. Fitness, for the past three years in the engineering department of the Chrysler Corp., has joined the Belflex Corp. of New York, as a sales engineer, with headquarters in Detroit. Mr. Fitness has been connected with the industry since its early days.

Brown Joins Oakland

Frank Brown, manager of the Boston Advertiser automobile department, has been appointed general manager of the Oakland Motor Car Co. of New England. He will have charge of the wholesale department formerly handled by William B. Sawyer now regional manager for the Oakland factory in this territory. Mr. Brown has been sales manager for the Boston Oldsmobile Co. before entering the newspaper field.

G. M. C. and Mathis Will Not Affiliate

Interviews Between Two Companies End Without Agreement Says Executive

NEW YORK, April 14—The following statement regarding the negotiations between the General Motors Corp. and the Societe Anonyme Mathis of Strasbourg was recently issued to the French press:

There has been recently some talk in the press to the effect that a large American automobile corporation was about to sign an agreement with an important French firm.

Questioned on this subject, M. J. D. Mooney, vice-president of the General Motors Corp., who is in charge of all the foreign activities of the corporation, declared that the latter at no time concluded an agreement of any kind whatever with a view to acquiring a financial interest in the French Mathis firm, the name of which was mentioned.

M. Mooney also stated that although there had been interviews between M. Mathis and the officials of the General Motors Corp. concerning the possibilities of establishing an industrial agreement between the two companies, the efforts made with a view to arriving at a basis of cooperation which should be mutually satisfactory came to naught.

The distribution of the products of the General Motors corporation in France therefore will be continued by the recently organized French firm General Motors (France).

Fiat Business Shows Large 1925 Increase

NEW YORK, April 14—The annual meeting of the stockholders of the Fiat company was held at Turin on March 6. In the annual report it was stated that during the year 1925 the company had greatly increased its markets both at home and abroad. It acquired a controlling interest in the S. P. A. automobile works, without, however, interfering with the manufacture of cars of that make. At the present time the Fiat company has 35,000 employees or 7200 more than on Jan. 1, 1925. Sales amounted to 1,260,000,000 lira or 480,000,000 lira more than in 1924. The new small Fiat model 509 has been well received. Up to the date of the report 5500 had been turned out, and the rate of production then was 95 per day.

Form Autogiro Company

LONDON, April 1 (*by mail*)—The successful tests of the LaCierva Autogiro have led to the formation of the Cierva Autogiro Co., Ltd., with offices at Bush House, Aldwych. The directors of the company are Air-Commodore J. G. Weir, chairman and managing director; Sr. don Juan LaCierva, and H. K. M. Kindersley, son of Sir Robert Kindersley, a well-known London banker. Frank T. Courtney, who piloted the Autogiro during its recent tests has been appointed technical manager. The company will carry on research work in connection with the invention and will dispose of the construction rights of the Autogiro in foreign countries.

Col. E. J. Hall **C. S. Sale** **F. R. Fageol**

Directing heads of the American Car & Foundry Motors Co., C. S. Sale, president, Col. E. J. Hall, vice-president in charge of production and engineering, and F. R. Fageol, vice-president in charge of marketing policies

See 35,000 Attendance at 1927 Roads Exhibit

WASHINGTON, April 15—Plans for the 1927 road show and convention of the American Road Builders' Association will be completed at the yearly meeting of the organization to be held in New York on May 14. Representatives of the U. S. Bureau of Good Roads will attend the May meeting, led by Thomas H. MacDonald, chief of the bureau. More than 35,000 engineers, contractors and highway officials are expected to attend the 1927 convention, representing all parts of North and South America. A large part of the association will be in attendance at the May meeting.

Form Johnson Products

CHICAGO, April 15—The Johnson Motor Products Co., an Illinois corporation, has been organized to absorb, as of Jan. 1, 1926, the manufacture and sale of all automotive products formerly produced by the Great Lakes Auto Products Co. of Chicago. The new company is comprised of the same executive and sales personnel that has directed the Great Lakes Auto Products Co. Policy will be unchanged and distribution will be through jobbers.

New Armstrong Engine

LONDON, April 1 (*by mail*)—It is reported that Armstrong-Siddeley Motors, Ltd., are experimenting with an air-cooled engine. The engine is to develop about 70 hp. and will weigh in the neighborhood of 160 to 170 lb. It will probably be ready in time for the Daily Mail competition.

Tire Building Aim of New Mexican Tax

Government Would Bring Industry to Use Guayule Rubber—Pays Road Costs

MONTEREY, MEXICO, April 12—The increase of 10 per cent in the tax on the sale of automobiles and tires by the Mexican Government, effective March 27, is explained by the official decree as intended to pay for road construction and to encourage Mexican tire building. In explanation of the government's action in increasing the tax, it is stated that the cost of constructing new trunk highways, which work is now in progress, is heavy and that automobile dealers are the chief financial beneficiaries of these improvements through the increased sales of automobiles and tires; it is therefore deemed just and proper that the dealers should pay an additional tax to the government.

The 10 per cent tax which has been levied on the sales of automobiles will, it is expected, encourage the manufacture of tires in Mexico. It is stated that the guayule rubber resources as well as other conditions make the domestic manufacture of tires an attractive proposition. Dealers in automobiles and tires will make no protest against the new taxes, it is stated. The tax will be added to the sales prices.

$125,000 Bus Station

OAKLAND, CALIF., April 12—The California Transit Company has started work on its new union stage depot covering approximately three-quarters of an acre, and intended to serve all motor stage lines operated by this company in northern and central California. The building is to cost $125,000, and will contain modern appliances for handling baggage, express and passengers.

Peugeot Party Here to Show Products

Will Demonstrate Heavy-Oil Engine and Light Sedans —Seek Show Entries

NEW YORK, April 12—The Peugeot mission to the automotive industry of the United States will spend this week in Detroit, returing to its headquarters at the Hotel Commodore here Saturday. Headed by Lucien Rosengart, vice-president, the mission will seek to interest American participation in a motor boat exhibition to be held in Paris as an addition to the automobile show; it will demonstrate the Peugeot heavy oil engine installed in a passenger car and in a truck, and will introduce the Peugeot two-seater sedan, Europe's smallest light car, to the American industry.

The demonstration models did not arrive with the mission but were scheduled to reach New York during the present week. These include a phaeton with a Peugeot two-cylinder two-stroke heavy oil engine, a 4-ton truck on pneumatic tires having the same type engine, and two of the 5 hp. light sedans. The latter cars have a 43 cubic inch engine with L-head, a ball-bearing crankshaft and develop 15 hp. at 3500 r.p.m. The three-speed transmission is on the rear axle, which is worm type without a differential, having a reduction of 6 to 1. The wheelbase is 89 in., track 38 in. and weight 970 lbs. Four-wheel brakes are fitted and standard equipment includes balloon tires.

Traffic Compels Small Car

"Traffic conditions in all big cities will force America to the small car just as they have done in Europe," M. Rosengart declared. "It is primarily a question of handiness in traffic and ease of parking, low operating costs being of secondary importance. The future of this type of automobile lies in the cities."

One of the purposes of the mission is to study the possibilities of introducing the light type car to the American market and some arrangement may be made during the present visit whereby these cars may be made by some American manufacturer if market conditions are regarded as satisfactory. Under the arrangement, it is understood, the Peugeot company would turn over its design for American adaptation.

Members of the mission, in addition to M. Rosengart, are Eugene and Rodolphe Peugeot, sons of Robert Peugeot, president of the company, the two technical directors, M. Teinturier and M. Jullien, Engineers Zettwoog and Maillard, and M. Lebaupin, export manager.

The motor boat show, which M. Rosengart is particularly interested in, will be the first international show of its kind. It will be held simultaneously with the automobile show Oct. 7 to 17, on the Cours la Reine on the banks of the Seine, partly on land and partly on water. British and Scandinavian motor boat manufacturers have promised co-operation and American boat and engine manufacturers also are asked to take part.

Just after departure of the mission from Le Havre, M. Rosengart received word that a factory for the manufacture of automobile parts which he owns, and which is located in Paris, had burned down. The plant represented an investment of 25,000,000 francs and employed 1200 men.

Lucien Rosengart

Vice-president of the Peugeot Automobile Co., who is in the United States at the head of a mission to interest American manufacturers in the international motor boat show to be held in conjunction with the Paris automobile show, and to introduce the Peugeot heavy-oil engine and the Peugeot 5 hp. sedan to the American industry.

M. Rosengart is recognized as one of the most active and enterprising members of the French automobile industry. He started in business with three workmen and a borrowed capital of $100. In five years he removed five times to larger plants and in 1914 established his company as one of the largest in France, specializing in automobile parts and accessories.

After the armistice he joined forces with Andre Citroen. He formed a company with a capital of 20,000,000 francs and enabled Citroen to reorganize on a large production basis.

Joining Peugeot later he became vice-president and general manager and in 1925 increased production from 9000 to 30,000 without increasing the staff.

Federal Changes Model

DETROIT, April 15—Federal Motor Truck Co. has announced several improvements on its "Big Six" model truck. These new features include a deeper frame and a redesigned radiator shell of polished aluminum. A nickeled Moto-Meter with crossbar cap has also been added.

British Production Increased in 1925

Truck Imports and Assemblies Reported Declining in Face of Home Demand

NEW YORK, April 12—Calculations by the "Motor Trader," based on British Ministry of Transport returns, indicate that 176,197 British passenger cars and trucks were produced last year, against 133,811 in 1924 and 89,682 in 1923.

Passenger car production rose from 67,334 in 1923 to 102,566 in 1924 and 131,834 last year, while truck output increased from 22,348 to 31,245 and 44,363.

Motor vehicles in use in England are now estimated at more than 1,500,000 or one to every 30 inhabitants compared with one to every six in the United States. Average retail prices of the 176,000 vehicles produced last year was $1,500. High-powered de luxe models alone increased in price, other prices falling with growth in output.

The 10 and 12-horse power models represented 59 per cent of total production in 1924 and 68½ per cent last year. Home sales of British-made trucks last year were 40,199, or 40 per cent more than in 1924 and about 66 per cent of the total home sales against 55 per cent in 1924. Imports and assemblies declined from 23,837 to 20,119.

British Market Dull— Some Price Cuts Made

WASHINGTON, April 15—Car and truck sales in England are generally disappointing because of unfavorable weather and the unsettled industrial outlook, the Automotive Division of the Department of Commerce learns through a cable dispatch from Acting Commercial Attache H. D. Butler at London. Domestic automotive manufacturers are relieved at the settlement of the engineering dispute and a steady output is being maintained, although some light car firms are heavily stocked.

English importers report the lightest March sales in some foreign cars for several years, although a few types of popular American cars have done well. Additional price reductions ranging from £10 to £40 have been made on several domestic and foreign makes of passenger cars.

To Open Norway Roads

WASHINGTON, April 12—Advices received by the Department of Commerce indicate the projection of new roads connecting the city of Bergen, Norway, with the rest of Norway, thereby increasing considerably the demand for automobiles. With present road systems it is impossible to drive more than 20 miles in any direction outside the city. Bergen is declared, nevertheless, the logical distribution point for all cities on the west coast.

New Stock to Meet Murray Obligations

Creditors Draft Tentative Plan of Reorganization—Operations Continue High

DETROIT, April 10—A tentative plan of reorganization of the Murray Body Corp. was decided upon at a meeting of the creditors of the company just held. The plan calls for the issuance of $3,086,000 new 7 per cent preferred stock and $2,796,900 ordinary preferred and increasing common shares outstanding to 692,264 no par shares.

This plan will provide $4,000,000 in cash. The new 7 per cent preferred would go to retire a $1,000,000 purchase money claim of the Hupp Motor Car Corp., $500,000 loans by individuals, and take up 25 per cent of the bank claims and 60 per cent of the creditors' claims. The cash would go to pay remaining unsecured claims, 40 per cent of merchandise claims and 50 per cent of bank debt, the remaining 25 per cent of bank debt to be liquidated by the issue of common stock on a basis of $10 a share.

At the meeting W. R. Wilson, president of the Guardian Trust Co., receiver for the body company, outlined the progress of the receivership since Dec. 4, 1925. He said that 9,000 bodies were shipped in December, 10,800 in January, 13,000 in February and 14,000 in March. The April schedule will be greater than March. January profits were $158,000 and February $226,000.

Mr. Wilson said the receiver's examination warrants a write-off of about $380,000 on inventory and $150,000 on receivables. The tax claim set up by the Government affecting taxes of the former Wilson Body Co., for the years 1917 to 1921 has been covered by a reserve of $425,000.

Pierce-Arrow Shipments Show 30% Quarter Gain

BUFFALO, April 12—President Myron E. Forbes of Pierce-Arrow Motor Car Co. announces that the number of series 80 cars shipped in March was 73 per cent higher than March last year, establishing a new monthly shipment record for the company.

Shipments of all vehicles in March increased 33 per cent over the March, 1925, total and first quarter shipments this year were 30 per cent higher than during the same quarter last year. These figures cover series 33 and 80 passenger cars, heavy duty trucks and busses.

President Forbes adds that the introduction of a complete line of coaches with aluminum bodies on the standard series 80 six-cylinder chassis has greatly stimulated interest in Pierce-Arrow products. The factory is now running at capacity and sales in 1926 are expected to exceed the record established last year.

FIRESTONE DRAFTS PHILIPPINE PLAN

MANILA, April 12—A tentative plan for the growing of rubber in the Philippines has been drafted here and will be submitted in June to the legislature, by Harvey Firestone, Jr., son of the American rubber magnate, who has been in the islands for the past several weeks making a survey.

The plan provides for leasing lands for 75 years, at the end of which period the land, together with improvements would revert to the government without compensation. The amount to be leased to any individual or corporation would be limited to 500,000 acres and the lessee would agree to plant at least 25 per cent of the land in rubber in 15 years. Opportunity to obtain leases would be limited to 10 years in order to stimulate immediate development of rubber possibilities.

Goodyear Seeks Order Granting Trade Mark

WASHINGTON, April 12—Goodyear Tire and Rubber Co. this week filed a complaint in equity in the United States District Court of Maryland to compel Thomas E. Robertson, U. S. Commissioner of Patents, to register its trade mark for tires manufactured by the Goodyear company. The complaint is in the nature of an appeal from a decision of the commissioner, who decided that the distinguishing marks of the tires were not registerable under the trademark act. This decision subsequently was upheld by the Court of Appeals of the District of Columbia, to which the complainant first appealed.

The Goodyear company charges that these decisions were "mistakes of fact and law" and asks that the court grant the relief prayed. The complaint was signed by C. F. Stone, vice-president; Wm. G. Henderson, of Washington, special counsel and Archibald Cox, of New York, general attorney for the company.

Federal Rubber Builds

MILWAUKEE, April 12—Work is being rushed on another large manufacturing addition to the Federal Rubber Co., division of Fisk Rubber Co., at Cudahy, suburb of Milwaukee. It is hoped to have the building ready for machinery by May 15 or June 1 at the latest. The Federal division is on its heaviest production schedule, producing 12,000 casings and 20,000 tubes a day, yet is falling behind on deliveries.

Names Foreign Outlets

DETROIT, April 12—Glass Mobile Corp., manufacturer of glass curtains for open cars, announces two new foreign distributors, one in New Zealand and one in Holland, and has arranged for a factory to manufacture its product in Australia.

Changes in Policy Strengthen Stearns

No Consolidation Contemplated and Company is Set to Remain in Cleveland

CLEVELAND, April 12—More than $500,000 has been expanded in plant equipment, new machinery and general improvement; the dealer representation has been increased and a new sales policy has been started in Cleveland during the three months that have passed since John N. Willys and associates took control of the F. B. Stearns Co., in this city.

It has been definitely established that the F. B. Stearns Co. will remain a Cleveland institution and continue to manufacture passenger cars. There is no consolidation and none is contemplated. There is a definite intention to increase production and raise the quality of service. With this in view, F. T. Larson, formerly connected with the sales departments of Hudson and Chrysler motor companies, has been made sales manager.

The correlation of improved engineering design and production methods has brought John T. Trumble as chief engineer and designer at the factory. He formerly was connected in an engineering capacity with General Motors Corp. O. T. Lawson, who has had years of experience with automotive companies, has been made manager of production and purchases.

Quarter Sales High

The Stearns Company has received many orders since the new models were displayed at the shows. The first three months of the present year will show an increase in sales of 89 per cent over the same period last year. During the Boston show the Stearns dealer sold more cars than during any previous show held there.

The engineering specifications have been improved, and tolerance of working parts held to the minimum so as to provide best operating conditions. Plant improvements give a bigger production capacity.

Fageol Opens Branches

SAN FRANCISCO, April 12—The Fageol Motors Co., of California, recently merged in the newly-formed American Car & Foundry Motors Co., has opened direct factory branches in San Francisco and Oakland. W. A. Knucky is in charge at San Francisco, and T. L. Baumgartner at Oakland. A large part of the parts stock held at the Fageol factory in Oakland will be transferred at once to the two factory branches according to J. H. Fort, general sales-manager of the Fageol plant. Butler-Veitch, Inc., of San Francisco, has acted as distributors of Fageol trucks for northern California for the past nine years.

N.S.P.A. Adds Space for 1926 Exhibit

DETROIT, April 14—The 1926 National Standard Parts Association convention and show will be held Nov. 15-19, inclusive, in the Hotel Sherman, Chicago, it has been officially announced at the office of E. P. Chalfant, executive vice-president of the association. Arrangements have been made providing twice as much floor space as was available last year.

C. W. Moffett, president of the association and chairman of the show committee, said:

"Plans are under way to make the 1926 show a land mark in the history of the replacement parts industry. More exhibition space has been provided than heretofore and it is confidently anticipated that all manufacturer members will show representative exhibits of their lines. Non-member jobbers and foreign distributors visiting this country will be invited and no stone will be left unturned to make this a successful undertaking. Only those manufacturers belonging to the N. S. P. A. can exhibit."

For the second day of the convention and show, Tuesday, Nov. 16, a banquet is planned which will be a truly social get-together of members and guests and their ladies. Speeches and business discussions will not be on the program.

Parts Lines Added

CLEVELAND, April 12—Parts Mfg. Co. has added two new parts to its line, connecting rod bolts and nuts and connecting rod clamp screws for floating type piston pins. Under its distribution policy, these new parts will be sold in conjunction with other items of its line through the regular jobbing trade.

Coming Feature Issues of Chilton Class Journal Publications

May—Automobile Trade Journal—Biggest Market Issue.

May 6—Motor Age—Sales and Service Reference Number.

Oakland Takes Over Stamping Production

PONTIAC, April 12—Oakland Motor Car Co. will take over the making of all its sheet metal stampings, due to the large production demands of its Oakland and Pontiac models and is now building a factory addition which will house this new department. All rear axle housings for the Oakland line will also be turned out in the new building. About 400 additional men will be employed.

By taking over this manufacturing operation itself, the company will benefit by greater economy and greater flexibility in the control of production, according to A. J. Brandt, vice-president and works manager.

A.E.A. Elects Members

CHICAGO, April 12—The following manufacturers were elected to membership by the Automotive Equipment Association at its mid-convention meeting here:

Manufacturers: Badger Rubber Works, Cudahy, Wis.; Billings & Spencer Co., Hartford, Conn.; Hardie Mfg. Co., Hudson, Mich.; Holley Carburetor Co., Detroit; Irving Engineering Co., Buffalo, Watervliet Tool Co., Albany, N. Y., Yellow Jack-It Mfg. Co., Chicago.

Stutz Carries Over 2414 March Orders

INDIANAPOLIS, April 10—Stutz Motor Car Co. of America, Inc., on March 31, had orders on hand valued at $7,250,000, representing 2414 car orders for immediate shipment, according to report of E. S. Gorrell, vice-president, to the company's board of directors. All orders are for standard production to be moved to dealers as rapidly as factory production facilities permit.

During March, Stutz shipments were 527 cars, representing a value in excess of $1,500,000. This was the largest month's shipping record the company has established, the previous high mark dating back to June, 1920. During each of the first three months shipments have been in excess of anticipated production capacity, and are now over 1000 of the new type chassis.

Mr. Gorrell also called attention to the balance sheet on which profits are shown as larger for the quarter than anticipated.

During March new dealer contracts were signed in 94 important cities, he said, and as soon as production permits, many more prospective dealers, will be added. Signing of foreign dealers also assures a satisfactory volume of foreign business, Mr. Gorrell said.

L. L. Fest Dies

CHICAGO, April 10—Louis L. Fest, local automobile dealer and for the last 26 years identified with Chicago's automobile shows, died here recently from an illness contracted while he was vacationing in Mexico. He was 64 years old. During the national shows here he acted as assistant general manager, aiding Sam A. Miles.

Calendar of Coming Events

SHOWS

May—International Street and Highway Traffic Safety Exhibition, City Hall, Vienna, Austria.

May 25 — International Exhibition of Roads, Transport and Touring, Show Grounds, Argentine Rural Society, Palermo, Buenos Aires.

Sept. 7-10—6th Annual New Haven Machine Tool Exhibition.

Sept. 10-17—Fifth National Radio Exposition, Grand Central Palace, New York.

CONVENTIONS

Apr. 21-23 — American Welding Society, Engineering Societies Building, New York.

April 28-30—Thirteenth National Foreign Trade Convention, Charleston, S. C., Francis Marion Hotel.

April 30—Annual Meeting of the National Highway Traffic Association Automobile Club of America, New York.

May 6-8—National Machine Tool Builders Association, Providence, R. I.

May 10-13 — 14th annual meeting Chamber of Commerce of the United States, Washington.

May 13-15—American Gear Manufacturers Association, Tenth Annual Convention, Book-Cadillac Hotel, Detroit.

May 17-21—National Electric Light Association and Electric Truck Manufacturers Association, Atlantic City, N. J.

May 28-29—National Motor Grinders and Rebuilders Association, Indianapolis.

June 7-12—Annual United States good roads show and convention, direction United States Good Roads Association, Inc., and Bankhead National Highway Association.

June 8-10—Automobile Body Builders Association with manufacturers' exhibit, Detroit, Hotel Statler.

June 14-19 — Automotive Equipment Association, Mount Royal Hotel, Montreal, Canada.

June 16-18—Thirteenth National Convention, Society of Industrial Engineers, Philadelphia, Bellevue-Stratford Hotel.

Oct. 4-8 — 45th Annual Convention, American Electric Railway Association and manufacturers' exhibit, Cleveland Public Auditorium and Annex.

Nov. 15-19—National Standard Parts Association convention and exhibit, Hotel Sherman, Chicago.

RACES

May 1 — Races at opening of new Speedway, Atlantic City.

May 10—Charlotte, N. C.

May 21-22—Tenth Annual Economy Run, Los Angeles to Camp Curry.

May 30-31 — 500-mile race, Indianapolis.

June 12 — Flag Day races, Altoona Speedway.

June 12-13—Rudge-Whitworth 24-hour stock car race, Le Mans, France.

June 27—French Grand Prix, Miramas Track, Marseilles.

Sept. 6 — Labor Day races, Altoona Speedway.

S. A. E. MEETINGS

National

June 1-4 — Semi-annual meeting, French Lick Springs, Ind.

Sept. 21-23 — Production Engineering Meeting, Hotel Sherman, Chicago.

Sectional

Apr. 19—Cleveland.
Apr. 22—Detroit.
Apr. 23—Chicago.
Apr. 23—Washington.